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ETHNOLOGY.—*Identification and history of the Small Robes Band of the Piegan Indians.*[1]

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A few years ago Dr. H. H. Turney-High questioned elderly Kutenai Indians of northwestern Montana and southeastern British Columbia about the other tribes of which they were aware. Among the people who lived across the Rockies to the east of the Kutenai they mentioned the—

> Little Blankets (k'tsaĭmaĭnána). These people lived in Canada and are said to be related to the Blood, although Chief Kustata denies that they are Blood proper. Most informants think that they were a band of Blood and are now extinct. Being of the Blackfoot group they were, of course, enemies.
>
> Chief Paul disagrees in the identification of the Little Blankets, claiming that they are just the ordinary enemy seen around Browning, that there is nothing mysterious about their identity, that they are just ordinary "South Piegan." (Turney-High, 1941, p. 28.)

In spite of their lack of agreement as to the exact identity of these people, it is apparent that the modern Kutenai referred to the Small Robes (Inuksiks), who were a large and powerful group on the Northwestern Plains little more than a century ago. A number of references to this group as Small Robes, Little Robes, Little Robe's Band, and even as Little Rogue's Band appear in the early literature on the Northwestern Plains region. Since the information on this once important group is widely scattered in meager references, some of which are conflicting, it may be well to bring it together and evaluate it here, and to add such information as we were able to obtain from elderly Indians on the Blackfeet Reservation, Montana, in the years 1942–44, regarding the present numbers of the Small Robes and traditional history of the group.

The earliest reference to the Small Robes was made by the artist-writer George Catlin, who regarded the Small Robes as a separate major division of the Blackfoot group of tribes. Catlin (1841, vol. 1, p. 52) divided the Blackfoot into "four bands or families, as follows: the 'Pe-a-gans,' of 500 lodges; the 'Blackfoot' band, of 450 lodges; the 'Blood' band, of 450 lodges; and the 'Small Robes,' of 250 lodges. These bands constituting about 1,650 lodges, averaging ten to the lodge, amount to about 16,500 souls."

Catlin never penetrated the Blackfoot country, although he did meet some Blackfoot Indians who visited Fort Union in the Assiniboine country on the Upper Missouri in the summer of 1832. Catlin obtained his information on the divisions and numbers of the Blackfoot from the fur traders at the fort. These men apparently considered the Small Robes to be a large and separate major division of the Blackfoot group, comprising some 2,500 persons, or roughly 15 percent of the total Blackfoot population. However, it is well to remember that American traders had a limited acquaintance with the Blackfoot in 1832. Fort Piegan, the first American trading post in the Blackfoot country, had been established less than a year before. Catlin's estimate for the entire Blackfoot group appears high in comparison with the estimates of other and probably better informed, white men.[2]

[1] Published by permission of the Secretary of the Smithsonian Institution. Received November 6, 1946.

[2] See Wissler, 1936. Tables of population estimates pp. 4, 6. The recollections of the aged fur

At an unrecorded date during his half century of contact with the Blackfoot tribes (1804–54), John Rowand, veteran Hudson's Bay Company trader, made an estimate of the population of these tribes. In addition to the "Blackfeet proper, Piegans, Bloods, Gros Ventres or Fall Indians, and Circes," he listed a sixth group, the "Mountain Tribes," comprising the "Cotones" (Kutenai) and Small Robes. He reckoned the combined population of these two "Mountain Tribes" at 250 tents or approximately 2,000 souls. (Hind, 1860, vol. 2, p. 152.)

Father De Smet, who became acquainted with the Small Robes in the early 1840's also considered them a separate tribe of the Blackfoot group. He definitely characterized them as non-Piegan:

> The tribe of the Piegans forms a portion of the six tribes known by the generic name of Blackfeet. The other five are the Blackfeet, properly so called, the Men of Blood, the Sarcees, the Little Robes, and the Grosventres.[3]

At the time of Father De Smet's early labors at the Flathead Mission in the Bitterroot Valley west of the Rockies, the Small Robes were at peace with the Flathead, although the majority of the Blackfoot were hostile. Possibly as early as 1842, the Small Robes visited the mission, became greatly interested in Christianity, and permitted many, if not all, of their children to be baptized by Father De Smet and his associates.[4]

In the year 1845, the Small Robes suffered a severe defeat in a battle with the Crows. Father De Smet mourned their loss in a letter from the west of October 30, 1845 (Chittenden and Richardson, 1905, vol. 2, p. 524):

> The year 1845 will be a memorable epoch in the sad annals of the Blackfeet nation. . . . The Crows have struck them a mortal blow—fifty families, the entire band of the Little Robe, were lately massacred, and 160 women and children have been led into captivity.

Denig (1930, pp. 551–554), the fur trader, probably referred to this action in a statement written in 1854:

> The Crow Indians a few years since, after killing all the men and boys of 50 lodges of the Blackfeet, took prisoners upward of 200 women and children. One of our gentlemen now in charge of that nation was with the Crow camp when the battle took place, and for two or three months afterwards, during which time he sought occasions to liberate about 50 women and send them home to their people.

However, the destruction of the Small Robes was not as complete as Father De Smet at first feared. A dozen lodges of Blackfoot accompanied the Flathead-Nez Percé camp on its fall buffalo hunt east of the Rockies in 1846, during which this allied force met and defeated the Crows in a fierce battle. De Smet complimented the small Blackfoot group on their bravery exhibited in the fight (Chittenden and Richardson, 1905, vol. 2, pp. 578–579):

> The little party of Blackfeet, animated by a spirit of revenge for the loss of half their tribe, massacred the preceding year by the Crows . . . did signal service in the combat.

In view of De Smet's conception of the Small Robes as a distinct tribal division of the Blackfoot, we may conclude that the Blackfoot members of that party must have been Small Robes. De Smet's earlier statement relative to the massacre of the entire tribe should be revised in the light of this later reference to the "loss of half their tribe" in the battle with the Crows in 1845.

Whether a considerable number of the Small Robes men, as well as the women, survived that battle, or whether a portion of the Small Robes were not engaged, we do not know. It is certain that the Small Robes, though greatly reduced in numbers, continued their existence as a group. The fur trader Charles Larpenteur met them south of the Missouri in the summer of 1848. He attempted to obtain horses from them, but they refused, as

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trader Hugh Monroe that the Small Robes numbered "more than one hundred lodges" in the second decade of the 19th century may be nearer the strength of the band in 1832 than Catlin's estimate. See also Schultz, 1927, p. 13.

[3] Chittenden and Richardson, 1905, vol. 3, p. 949. However, Father Nicholas Point, who spent the fall and winter of 1846–47 in the Piegan camps, did not consider the Small Robes a separate division of the Blackfoot group. Footnote 5, same page.

[4] *Ibid.*, vol. 2, p. 593. See McClintock, 1910, pp. 157–166, for a later Indian tradition of the Small Robes' relationship with Father De Smet and their acceptance of Christianity.

they had quarreled with their old friends the Flathead and feared, correctly, that Larpenteur would use the horses to carry arms and ammunition to their new enemy.

A band of Blackfeet, called the Little Robes, after the name of their chief, instead of following the rest of the tribe north after trade was over, remained on the south side of the Missouri. Some of Little Robe's young men happened to have a fight with the Flatheads; some one of each party was killed and horses were stolen. So the peace was broken and the Flatheads returned to their country as fast as they could. (Larpenteur, 1898, vol. 2, pp. 259–260.)

The peace referred to was the one established through the efforts of Father De Smet in September 1846, between the Flathead and the Blackfoot tribes at the Piegan camp east of the Rockies. Now the Small Robes, who must have been influential in the making of it, were among the first to break the peace.

In 1850, Thaddeus A. Culbertson, on the authority of Malcolm Clark, who was then in charge of the American Fur Company's post at Fort Benton, identified the "Little Robes" as one of the bands of the Piegan (Culbertson, 1851, p. 144). Three years later, J. M. Stanley, artist for the Pacific Railway Survey, included the "Little Rogue's band of 30 lodges" in his enumeration of Piegan bands (Stanley, 1855, p. 449). The sound similarity between "Rogue's" and "Robe's" is so close as to suggest the likelihood that an error was made in recording the interpreter's English translation. Certainly there is no other authority for the existence of a Piegan band by the name of Little Rogue's. Thus, in less than a decade, and primarily as the result of war casualties in a single battle, the Small Robes were reduced from a large band to a group of 30 lodges, much the smallest of the five Piegan bands enumerated by Stanley.

In the winters of 1855 and 1856 the Small Robes were characterized as a group of unwelcome loafers about Fort Benton. The band is mentioned in several brief entries in the Fort Benton Journal (McDonnell, 1940) during that period:

Jan. 9, 1855. A few lousey Pagans from Little Robes band arrived with a horse and a Robe or two to trade . . . [p. 16].

Jan. 16, 1855. Sent an Indian to Little Robe Camp to see if these Indians had not picked up our horses . . . [p. 18].

Dec. 16, 1855. . . . in the afternoon Camp of "Little Robes" arrived with their Lodges which they have pitched in the Prarie behind . . . [p. 56].

Dec. 18, 1855. Little Robe Band moved Camp and intend settling for the present at Pablos Island to dress what Robes they have . . . [p. 56].

January 9, 1856. A Little Robe Ind. passed with one Robe to trade being all we have got for the past two days . . . [p. 58].

January 13, 1856. The Little Robe band moving Camp from across on "Chantier" looked in to loaf and anoy us but gave us no Robes . . . [p. 59].

January 26, 1856. Some Little Robes paid us another loafing visit for the 100th time . . . [p. 61].

This pitiless description of the remnant of the once powerful Small Robes is in striking contrast to Lt. Bradley's opinion of what might have been their lot had it not been for the battle with the Crows in 1845. Writing 70 years ago, Lt. Bradley said of "the Little Robe band of Piegans" (Bradley, 1923, pp. 281–282):

At the time the whites first became acquainted with the Piegans (1831), though avowedly a part of the Piegan tribe, they lived wholly by themselves, seldom meeting with the remainder of the tribe and showing so marked a line of separation that by one or two writers they were classed as a separate tribe. Had they not unfortunately suffered utter extermination a few years later at the hands of the Crows, it is probable that long ere this their tribal independence would have been universally conceded.

George Bird Grinnell (1892, pp. 209, 225) identified the Small Robes as a Piegan band. In his diagram of the Piegan camp circle of about 1850–55, he placed the lodges of the Small Robes in the southeastern portion of the circle, indicating that the Small Robes were considered an integral part of the Piegan tribe. Clark Wissler (1911, p. 11) listed the Small Robes as a Piegan band.

In our investigations on the Blackfeet Reservation, Montana, from 1942–44, it was found that only two families, the Day Riders and the Calf Robes, were considered by the older Indians to be members of the Small Robes band.[5]

[5] Research performed under the auspices of the U. S. Indian Service, while the writer was Curator, Museum of the Plains Indian, Browning, Mont.

Mike Day Rider (born 1871), senior surviving member, said that the Small Robes were always a Piegan band, joining the Piegan camp circle each summer for the tribal sun dance. He had "always been told" that the Small Robes had once been a very large band. However, he knew nothing of any disastrous battle with the Crows in the early days or of his people's early interest in Christianity. He recalled that the Small Robes were said to have been more friendly toward the Flathead than other Piegan bands; that the Small Robes had even furnished ammunition to the Flathead for use in fighting the other bands of the Blackfoot. Mike said that the Small Robes broke up as a residential group while the Blackfeet Agency was at Old Agency, about 60 years ago. Lodge Pole, the last chief of the Small Robes, died in the 1890's. Day Rider had not heard of a chief of the band by the name of Little Robe. He recited the following tradition of the derivation of the name of the band:

> A long time ago there was a young woman of this band who was very pretty. Many young men wished to marry her, but she refused them all. Her father asked her to marry a certain young man he had selected for her. Still she refused. Later the young woman found a sweetheart of her own choice. She doubled a year old buffalo calf robe over her head and neck like a scarf and went to meet him. That is how the Small Robes band got its name.

Richard Sanderville (Chief Bull), who is not a Small Robes member, cited additional traditional evidence regarding the history of the band. His version of the origin of the band name differed from Mike Day Rider's:

> The band was named after the peculiar custom of its members of wearing pieces of buffalo robes, smaller than whole robes, as shawls thrown over their shoulders when visiting other bands.[6]

He said that the Small Robes once fought a bitter battle with the entire Crow camp in the Judith Basin country south of the Missouri, and that the chief of the band, who went by the name of Little Robe, died of wounds received in that battle. He had heard that some of the Small Robes women, dressed as men, took active part in the fighting. Sanderville was also familiar with the tradition of Small Robe friendship with the Flathead:

> They were very friendly with the Flatheads, and frequently joined them in hunting buffalo on the plains. At one time, before the 1855 Blackfoot Treaty, the Piegans fought the Flatheads on the Musselshell River. On that occasion the Small Robes helped the Flatheads by supplying them with Piegan ammunition.

Sanderville stated that the Small Robes were always a Piegan band, joining the other bands each sun dance season in the great camp circle. He understood that the Small Robes were once a very large band.

Other elderly Piegan Indians, who were not members of the Small Robes band, believed that it was at one time very large, more friendly toward the Flathead than other Piegan bands, but definitely a band of the Piegan tribe, not a separate division of the Blackfoot group.

CONCLUSIONS

In the early part of the 19th century the Small Robes were probably the largest band of the Piegan Indians. Catlin's estimate of the band's size in 1832 is probably high. We estimate conservatively that the band may have numbered as many as 150 lodges and nearly 1,500 souls before the smallpox epidemic of 1837. Although there is no record of Small Robes losses in that disaster, doubtless their numbers were considerably lessened by that plague. In Father De Smet's time (1844), the Small Robes probably numbered 80 or more lodges. Of these, the men of approximately 50 lodges were massacred in a bitter fight with a large body of Crow Indians in 1845. By 1853, the Small Robes numbered about 30 lodges. Since that date their membership has decreased until, at the present time, only two families of this once powerful band remain—the Day Riders and Calf Robes of the Blackfeet Reservation in Montana.

Because of the large size of the Small Robes band prior to 1845, and their relative independence of action (which was made possible by their numerical strength), the group was considered by Catlin's sources of information, by the experienced Canadian

[6] McClintock, 1923, p. 251: They were called "Small Robes, because of the size of their robes."

trader John Rowand, and by Father De Smet to have been a major division of the Blackfoot group of tribes, distinct from the Piegan. This independence of action was most marked in their friendship for the Flathead, whom most Piegan regarded as tribal enemies. Not only did the Small Robes join the Flathead on their buffalo-hunting excursions on the plains east of the mountains, but also they journeyed across the Rockies to pay friendly visits to the Flathead camps in the Bitterroot Valley. At the Flathead Mission they came under the influence of Father De Smet and his associates, who baptized the Small Robe children in the Christian faith. The Small Robes were probably the first of the Piegan bands to accept Christianity. This was before the Small Robes' crucial battle with the Crows in 1845, which, in one tragic action, reduced the position of the Small Robes from one of power and influence to one of minor importance. Never again did the Small Robes play a significant role in the history of the Northwestern Plains.

Only when we realize that information on the history of other Blackfoot bands before 1850 is practically nonexistent, can we appreciate the significance of this fragmentary sketch of the Small Robes. Had not George Catlin, John Rowand, and Father De Smet failed to recognize the Small Robes' Piegan affiliations, we should know considerably less about the band than we do. In reality, far from being a little-known band, as some writers have suggested, we have greater knowledge of the history of the Small Robes than of any other band of the entire Blackfoot group.[7]

[7] In Larpenteur, 1898, vol. 2, p. 259, footnote, Editor Coues states: "These do not appear to have been a well-known band." Chittenden and Richardson, 1905, vol. 2, p. 524, editors' footnote . . . "they seem to have been little known, and were probably not a large band."

BIBLIOGRAPHY

BRADLEY, JAMES H. *Characteristics, habits and customs of the Blackfeet Indians.* Montana Hist. Soc. Contr. **9.** Helena, 1923.

CATLIN, GEORGE. *Letters and notes of the manners, customs and condition of the North American Indians,* 2 vols. London, 1841.

CHITTENDEN, H. M., and RICHARDSON, A. T. (Editors). *Life, letters and travels of Father Pierre Jean De Smet,* 4 vols. New York, 1905.

CULBERTSON, THADDEUS A. *Journal of an expedition to the Mauvaises Terres and the Upper Missouri in 1850.* Ann. Rep. Board Regents Smithsonian Inst. for 1850. Washington, 1851.

DENIG, EDWIN THOMPSON. *Indian tribes of the Upper Missouri.* Edited by J. N. B. Hewitt. 46th Ann. Rep. Bur. Amer. Ethnol. Washington, 1930.

GRINNELL, GEORGE BIRD. *Blackfoot Lodge tales.* New York, 1892.

HIND, HENRY YOULE. *Narrative of the Canadian Red River Exploring Expedition of 1857 and the Assiniboine and Saskatchewan Exploring Expedition of 1858,* 2 vols. London, 1860.

LARPENTEUR, CHARLES. *Forty years a fur trader on the Upper Missouri.* Edited by Elliott Coues. 2 vols. New York, 1898.

MCCLINTOCK, WALTER. *The Old North Trail.* London, 1910.

———. *Old Indian trails.* Boston, 1923.

MCDONNELL, ANNE (Editor). *The Fort Benton Journal, 1854–1856.* Montana Hist. Soc. Contr. **10.** Helena, 1940.

SCHULTZ, J. WILLARD. *Red Crow's brother.* Boston, 1927.

STANLEY, J. M. *Visit to the Piegan camp.* Reports of Explorations and Surveys to Ascertain the Most Practicable and Economical Route for a Railroad from the Mississippi River to the Pacific Ocean. 33d Congr., 2d Sess. House Doc. 91, vol. 1. Washington, 1855.

TURNEY-HIGH, HARRY HOLBERT. *Ethnography of the Kutenai.* Mem. Amer. Anthrop. Assoc., no. 56. Menasha, Wis., 1941.

WISSLER, CLARK. *The social life of the Blackfoot Indians.* Amer. Mus. Nat. Hist. Anthrop. Pap. **7** (pt. 1). New York, 1911.

———. *Population changes among the Northern Plains Indians.* Yale Univ. Publ. Anthrop. no. 1. New Haven, 1936.

PALEONTOLOGY.—*A new palaeoniscoid fish from the Lower Permian of Texas.*[1]

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In a recent review of the vertebrate fossils originally described by Fritsch (1879–1904) from Kounova, Czechoslovakia, Dr. A. S. Romer (1945a) demonstrated a striking similarity and essential contemporaneity between this late Stephanian assemblage from Europe and the early Autunian fauna from the Wichita Group of Texas. Of interest in this connection, as mentioned by Romer (1945a, p. 423), is a new palaeoniscoid fish from the Texas formations which is referable with sufficient probability of correctness to the genus *Progyrolepis* Fritsch from Kounova. The remains of ray-finned fishes are notably rare both at Kounova and in the Texas Redbeds. The present description is offered in order to make known not only a genus common to both localities but also only the third addition to the actinopterygian fish fauna of the Texas Permian formations, since that fauna was last comprehensively reviewed by Hussakof in 1911 (Case, 1935; Dunkle, 1939).

The single specimen, on which this report is based, was collected in 1933 by the Museum of Comparative Zoology Expedition of Harvard University. The scattered remains are contained in a highly calcareous, gray clay and were incompletely recovered on a number of weathered pieces of this matrix. On preparation, several of these fragments were found to fit together. The conditions of preservation prevent consideration of general body proportions and little detail can be offered regarding the structure and position of the fins, and the roofing, temporal and opercular series of bones. Discernible with fair accuracy, however, is an obliquely crushed and badly distorted skull, which shows the sphenoidal and orbitotemporal portions of the neurocranium, certain elements of the primary branchial arches, the cheek plates, both upper and lower jaws, the gular plates, and the branchiostegal rays. In addition, there are preserved many disassociated scales from various parts of the body, portions of two fins, and several axial supports.

The specimen was collected by Dr. Theodore E. White, and its study permitted by the courtesy of Prof. A. S. Romer, curator of vertebrate paleontology, Museum of Comparative Zoology.

Superorder CHONDROSTEI
Order PALAEONISCOIDEA
Family PALAEONISCIDAE, s. str. (Aldinger, 1937)
Genus **Progyrolepis** Fritsch (1893)

First mentioned by Fritsch in a faunal list of the Kounova material published in 1883, the species *speciosus* was originally assigned to the Triassic genus *Gyrolepis*. There seems slight doubt that this is the same form for which the generic name *Progyrolepis* was subsequently proposed in 1893. Aside from a reference by Woodward (1891, p. 501) to *Elonichthys speciosus*, this fish apparently has received little attention by later writers, although Romer (1945b, p. 579) accords it valid generic rank as a member of the restricted family Palaeoniscidae (Aldinger, 1937, p. 229).

Structurally the form may be briefly characterized as follows: medium-sized, fusiform fishes; skull broad and low with large forwardly situated orbit, and very oblique suspensorium. Frontal wider behind than forwardly. Supratemporal-intertemporal large, preceded in anterior sequence by a small dermosphenotic, and a much enlarged postorbital. Maxillary with short exposed infra-orbital portion; peculiar long, low, triangular postorbital expansion; and deeply produced posteroventral angle. Mandible without coronoid or angular processes. A pair of preoperculi present on either side. Branchiostegal rays are numerous, about 15 pairs. Median gular small, and the posteriorly succeeding single pair of lateral gulars only moderately enlarged. Dentition consisting of a more lingual series of large conical teeth irregularly interspaced with smaller ones. Bones of the head ornamented with pustulate tubercles and short irregular ridges of ganoine.

Scales small and only moderately thick; mostly rhomboidal; ranging from ones slightly

[1] Received October 31, 1946.

deeper than long to examples only one-third as high as long. All with a robust, internal, vertical rib. Peg-and-socket articulation developed only on some of the flank scales. Ornamented with coarse, diagonal ridges and grooves. Ganoine restricted to the crests of the ridges.

Fin rays closely articulated; each segment being ornamented with a few longitudinal ridges. Fulcra minute.

Genotype.—*Progyrolepis speciosus* Fritsch.

Progyrolepis tricessimalaris, n. sp.

Type.—M.C.Z. Cat. Fos. Fishes No. 6619; an obliquely crushed skull largely lacking the roofing, temporal, and opercular series of bones; also several associated fragments showing body scales, portions of two fins and several axial supports.

Geological horizon.—Admiral formation, Wichita Group of the Lower Permian.

Locality.—In Rattlesnake Canyon, 9 miles southeast of Dundee, Archer County, Tex.

Diagnosis.—An early Permian form that differs from the late Pennsylvanian European genotype in a more uniformly tuberculated ornamentation of the head bones; lack of basally ornamented teeth; and a proportionate enlargement of the grooves and somewhat more regular ridge pattern of the scale ornamentation.

Description.—The left lower jaw measures 4.9 cm in length. This dimension would seem to indicate a medium-sized fish possessing a total skull length of about 7 cm and a total body length not much exceeding 35 cm. The skull is proportionately long, low and moderately broad. From these points, it may prove permissible to assume that in general body proportions the fish was slenderly fusiform.

The endocranium is incomplete. Two pieces, however, which roughly include the anterior two-thirds of the neurocranial complex, are preserved. The retention of recognizable shape by these parts seems due to rather complete ossification. In texture, they are coarsely granular with a thin investiture of delicate perichondral bone. No sutures have been detected within these preserved portions of the braincase.

The anterior of the two endocranial parts is observable in dorsal view. Its left margin is covered by the displaced remnants, from the left side, of the frontal, the postorbital and fragmentary elements of the palatoquadrate complex. The right margin is entire and is traceable from a transverse plane in the hind portion of the orbit forward to an apparently complete anterior extremity. This extremity is presumably the tip of the sphenoidal ossification rather than the anterior limits of the ethmoidal calcification, since the part is uniformly narrow and is without the forward, laterally expanded structures which among other functions house the anterior myodome and enclose the olfactory organs. The dorsal surface is gently convex from side to side, and is completely covered with the thin lamella of perichondral bone. In consequence, it seems doubtful that the anterior fontanelle, normally large in the palaeoniscoids, was extended as far forward as the sphenoidal region. A low shelf extends transversely across the roof showing the position of the frontopostrostral suture. Two notches are shown on the right margin of the part. The more anterior of the two is situated near the anterolateral extremity of the postrostral bone. The posterior notch occupies the position of the anterolateral angle of the frontal. Both are assumed to have accommodated branches of the superior ophthalmic nerve to lateral line sensory organs of the supraorbital canal.

The posterior of the two preserved endocranial parts comprises the orbitotemporal region and is exposed in dorsolateral aspect from the left side. Recognizable structures on this part are the longitudinal, median dorsal, cranial vault which is crushed down into the lower and more laterally lying parts of this neurocranial region. These latter show with clarity the anterior reaches of the fossa bridgei, the posterodorsolateral wall of the orbit, and postorbital process, and the vertically disposed concavity posteriorly adjacent to the postorbital process into which the spiracular canal has its ventral opening, and against which the ascending wing of the parasphenoid articulates. A foramen pierces the observable part of the orbital wall. A similar foramen in *Pteronisculus* (=*Glaucolepis*) (White and Moy-Thomas, 1940) is thought by Nielson (1942) to convey a vein. A well-pronounced spiracular groove traverses the floor of the fossa bridgei forwardly and laterally from behind to enter the large spiracular canal. At the point of juncture between the spiracular canal and groove a distinct notch may be remarked, which very

probably transmitted the otic branch of the facial nerve. An extremely narrow and poorly defined area, devoid of the perichondral lamella, in the median dorsal line has been tentatively identified as the anterior fontanelle. It arises well back opposite the postorbital process and extends posteriorly for an undetermined distance. A median and backwardly projecting process of bone from its anterior margin appears to partially divide the vacuity. Whether this apparent posterior restriction of the anterior fontanelle has any taxonomic or phylogenetic significance, or is merely a case of more complete ossification, has yet to be determined. As thus incompletely revealed the endocranium of the present specimen offers no structures at wide divergent development from any of the few palaeoniscoid braincases yet known in detail. It seems to agree most closely to those of Palaeoniscid B from the Kansas Pennsylvanian described by Watson (1925), and of *Pteronisculus* from the Greenland Triassic studied by Nielson (1942).

Regarding the dermal bones investing the neurocranium, ventrally, the parasphenoid is not evident. The portion of a bone is displayed between the displaced anterior extremities of the mandibles but is too imperfectly exposed for other than tentative identification as the vomer. Dorsally, the posterior half of the left frontal alone is preserved of the roofing bones adjacent to the median line. The left margin of this element is hidden, but the bone is indicated to be of irregular shape, much wider behind than in its forward part, and to have articulated with its opposite member in a rather sinuous, overlapping, median suture. While partially impressed on the sphenoidal ossification the entire outline of the postrostral plate can not be determined. Dorsolaterally in the position of the temporal bones, the lateral edges and in narrow extent the external surfaces of three elements are exposed. The most posterior of these three is long and is termed the supratemporal-intertemporal. The middle element of the series is small, and in bearing a curved segment of the infraorbital sensory canal is called the dermosphenotic. The third and most anterior of the three bones is identified as the postorbital despite an inability to demonstrate the infraorbital canal. The posterior extremity of this latter element is wedged between the dermosphenotic dorsally, and the circumorbital series ventrally. It is extended notably far anteriorly, presumably paralleling the lateral edge of the frontal, to assume in greater or lesser degree the role of the supraorbital bones.

The orbit appears to have been rather large with its hind margin situated at the middle of the maxillary length. Only the most posterodorsal and next anteroventrally succeeding infraorbital bones are present. These are narrow and the former shows the infraorbital sensory canal. Although bony tissue remains in the position of the suborbitals, the number and shape of these components of the cheek can not be determined.

The gape of the mouth is wide and the suspensorium is very oblique. The maxillary is of the usual palaeoniscoid form but is remarkable in the great proportionate length and lowness of its vertically expanded postorbital portion, which is correspondingly triangular in outline rather than quadrangular. Its posteroventral angle is produced downward to overlap widely the proximal end of the mandible. It seems probable that the maxillaries articulated with each other anteriorly although this can not actually be observed. The forward portions of

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FIG. 1.—*Progyrolepis tricessimalaris*, n. sp. (M.C.Z. Cat. Fos. Fish No. 6619). Photographs of the fragmentary skull in (A) dorsolateral aspect from the left side and in (B) inferior view with (C and D, respectively) corresponding explanatory sketches. Approx. $\times\frac{3}{4}$.

a.hy, Groove for afferent hyoid artery; *Ang*, angular; *Art*, articular; *ba*, branchial arch elements; *Chy*, ceratohyal; *Cla*, clavicle; *D*, dentary; *Dp?*, dermopalatine; *Dsph*, dermosphenotic; *f*, fulcra; *fa*, anterior fontanelle; *fb*, fossa bridgei; *Fr*, frontal; *gp*, gular pit line; *Inf*, infraorbital; *lep*, lepidotrichia; *Lg*, lateral gular; *m. cp*, notch for posterior portion of coraco-arcualis muscle; *Md*, mandible; *Mg* median gular; *Mk*, Meckelian ossification; *Mx*, maxillary; *Ot*, orbitotemporal portion of neurocranium; *Pop. 1*, dorsal preoperculum; *Pop. 2*, ventral preoperculum; *p. po*, postorbital process; *pq*, remnants of palatoquadrate ossifications; *Pto*, postorbital; *Rbr*, branchiostegal rays; *ro*, notch for otic branch of facial nerve; *S?*, suborbitals; *s*, scales; *Sang*, surangular; *sci.*, infraorbital sensory canal; *sc.p*, preopercular sensory canal; *sc.s*, supraorbital sensory canal; *so*, notches for branches of the superior ophthalmic nerve to lateral line sensory organs in supraorbital canal; *Sph*, sphenoidal portion of the neurocranium; *spic*, spiracular groove and canal; *St-it*, supratemporal-intertemporal; *V?*, vomer; and *v*, foramen for vein.

both palatoquadrates are preserved but have been badly weathered. The remnants appear to be composed of lamellar bone but no sutures have been definitely established. On the right side, a slender dentigerous fragment occurs which may pertain to a dermopalatine ossification.

The mandible is large. It is low and slender anteriorly but progressively increases to a maximum depth posteriorly. The dorsal mar-

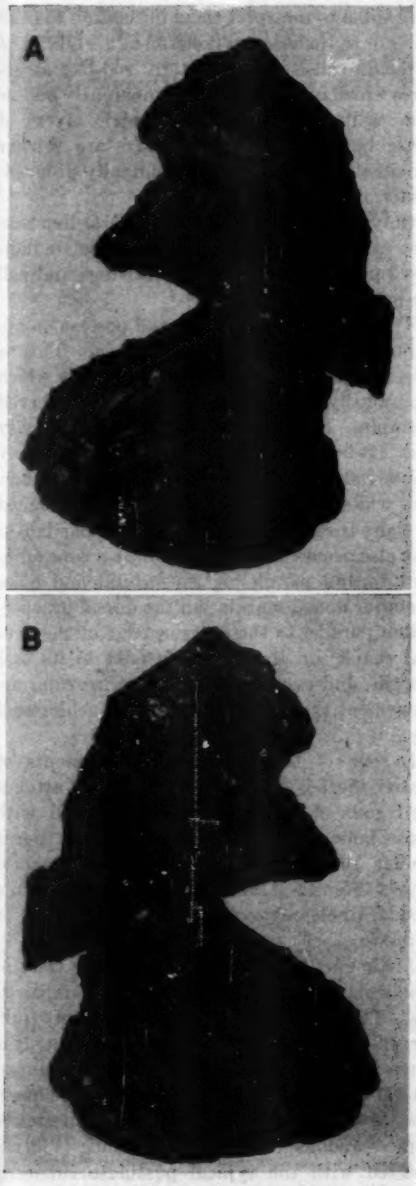

FIG. 1.—(See opposite page for legend.)

gin maintains a constant gentle concave profile throughout the total observable length of the complex and shows no evidence of a coronoid development. The Meckelian cartilage is well ossified posteriorly where exposed. The articular is high and robust. The quadrate articulates with it dorsally and a well defined vertical groove occupies its broad posterior margin. The determinable dermal bones of the mandible consist of the usual large dentary, a narrow, posteroventral angular which shows no appreciable dorsal expansion on either the external or internal faces of the lower jaw, and a short, moderately high supra-angular.

The maxillary and lower jaws are provided with both large and small series of teeth. As preserved, these have been badly eroded but appear to exhibit an irregular arrangement although the large ones generally are more lingually placed than some of the small ones. All are sharply conical, somewhat incurved, with "enamel" caps in their distal thirds, and without evidences of vertical striations or other ornamentation on their bases.

Of the bones associated with the hyoid arch only the ceratohyal, the preoperculum, the gulars and the branchiostegal rays are contained in the recovered fragments. The ceratohyal is a large element, considerably flattened during preservation. It appears composed of cancellous bone with a thick investment of dense lamellar tissue. It is deepest behind and tapers forward with no marked anterior deepening. A groove for the afferent hyoid artery traverses the edge of the element as exposed. The preoperculum is represented by two elements on either side. The large dorsal one of these is of characteristic form and while very obliquely inclined, the angle between the rather broad posteroventral, vertical shank and the slightly expanded anterodorsal portion is noticeably obtuse. The second preoperculum is small, somewhat deeper than long and appears to be firmly attached to the posteroventral extremity of the dorsal member. The median gular plate is relatively small and considerably wider anteriorly than posteriorly. It is flanked posterolaterally by a single pair of moderately enlarged gulars. The radii branchiostegi number a possible 15 on each side. They decrease in both length and width from front to back. The anterolateral angles of each seem to be produced in greater or lesser degree. The area of overlap on the first by the lateral gular is almost a third as wide as the exposed ornamented portion of the ray laterally, but is extremely narrow mesially.

Remnants of the branchial arches are displayed. None, however, are complete and it is impossible to interpret them in relation to each other or to the visceral skeleton as a whole. The elements consist of long, thin, rod-like structures which in some cases are apparently hollow with walls made up of concentric layers of dense bone. Generally, the bars are thicker proximally and all are longitudinally grooved, posteriorly.

Only small segments of the lateral line sensory canals have been detected. These are indicated on the accompanying drawings and call for no further discussion.

The dermal bones of the head possess an apparently complete layer of ganoine. This is raised into fine and closely set tubercles which are apically tumid even in the best preserved examples. Each has an internal pulp cavity and externally bears a few, comparatively coarse radial striae. On the frontal these tubercles, while not losing their identity, are aligned in short irregular ridge series. This partial fusion also occurs on the maxillary in a zone adjacent to and paralleling the orbital and more posterior dorsal margin; on the dorsal preoperculum parallel to the anterior edge of the ventral shank; on the mandible next to its oral margin; and completely covers in irregular arrangement the gular plates and branchiostegal rays.

In one of the unassociated fragments of matrix there is contained a number of attenuated rods of cancellous tissue rimmed with dense bone. In form, these structures appear similar to the "rifle-shaped" axial supports which Stensiö (1921, p. 189) termed the basidorsal elements of the vertebral column of *Birgeria*.

Little can be said regarding either the appendicular girdles or the paired and unpaired fins. The right clavicle is incompletely preserved and can be seen in external aspect. It is convex in transverse section and the dorsolateral margin is strongly notched for the insertion of the posterior division of the posterior coraco-arcualis muscle. The surface is ornamented with the typical pustulate tubercles which are sometimes irregularly arranged in

short ridges. The two fin remnants can not be identified. The rays composing each are similar: closely articulated; and ornamented with by no more than four coarse longitudinal ridges of ganoine. Of this ornamentation of the lepidotrichia, it may be further stated that the posterior three ridges are strong while the anterior one is usually less pronounced; trends obliquely toward the anterodistal angle of each segment, or may even be obsolete. The paired fulcral scales are minute.

The specimen shows quantities of well-preserved scales. Unfortunately all are scattered, and it has not been possible to determine from what body part any particular example was derived. Generally, however, the scales may be considered as small, averaging only 3.0 mm in length. A few are oddly sigmoidal in form, but

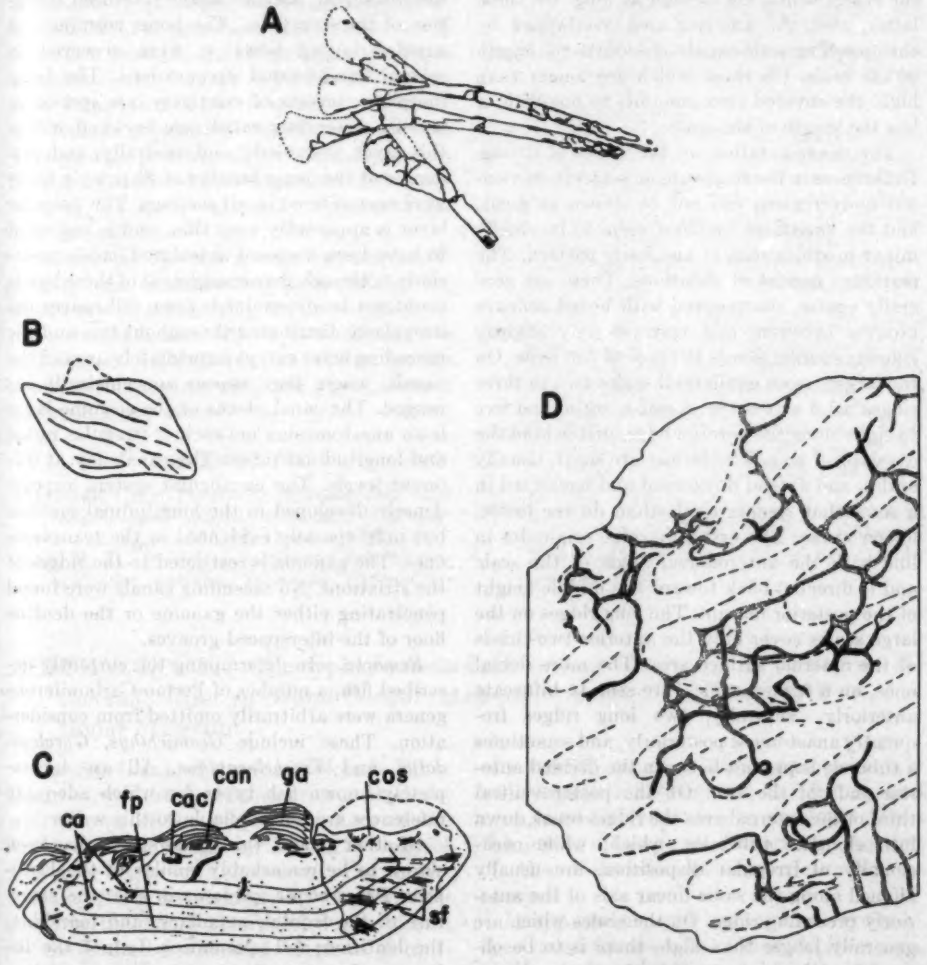

FIG. 2.—*Progyrolepis tricessimalaris*, n. sp. (M.C.Z. Cat. Fos. Fish No. 6619). A, Axial supports, Approx. ×2. B, Outline of flank scale with lines indicating the crests of ornamental ganoine ridges. Approx. ×8. C, Transverse section through scale. Approx. ×30. D, Horizontal section through scale showing arrangement of canals in cosmine layer and dashed lines indicating the pattern of external ganoine ridges. Approx. ×23.

ca, Vertical canals traversing bony footplate; *cac*, horisontal canals in cosmine layer; *can*, canaliculi: *cos*, cosmine layer; *fp*, laminated bony footplate; *ga*, ganoine; and *af*, Sharpey's fibers.

by far the majority are rhomboidal. None are much deeper than long, and commonly the height is one-half to one-third the length. All show a moderately produced anterodorsal angle; a nondenticulate posterior margin; almost uniform thinness; and a strong internal vertical rib which is in no case sharply delimited from the surface of the scale. Peg-and-socket articulations have been observed only on the scales which are as high as long. On these latter, also, the anterior area overlapped by the preceding scale equals one-fourth the length of the scale. On those which are longer than high, the covered area amounts to one-fifth or less the length of the scale.

The ornamentation on the scales is strong. Differences in the sculpture on scales from various body regions can not be shown as great, and the variations manifest seem to be chiefly minor modifications of one basic pattern. The markings consist of striations. These are generally coarse, sharp-edged with broad concave grooves between, and traverse only slightly sinuous courses across the face of the scale. On the larger, more equilateral scales two to three ridges arise across the dorsal margin, and five to eight along the anterior edge, just behind the overlapped area. The former are short, usually entire, and extend downward and backward in a somewhat steeper angle than do the latter, longer striae. The first long ridge originates in line with the anterodorsal angle of the scale and is directed back toward the middle height of the posterior margin. The long ridges on the large scales cover only the anterior two-thirds of the external surface area. The more dorsal ones, on a few examples, are seen to bifurcate anteriorly. Ventrally, two long ridges frequently anastomose posteriorly, and sometimes a tubercle is present between the divided anterior ends of the two. On the posteroventral third of the external area the ridges break down into elongate tubercles, which, while occasionally of irregular disposition, are usually aligned along the same linear axis of the anteriorly preceding ridge. On the scales which are generally longer than high, there is to be observed neither a decrease in size nor a change in the disposition of the ridges and interspaced grooves. The differences in ornamentation between the high and low scales consists merely of a reduction, commensurate with the external area, in the number of these markings. Those scales having the least height may entirely lack the striae arising along the dorsal margin, and the ridges originating along the anterior margin may be decreased in number to as few as two. Here, also, the long striae are not always broken down posteriorly into tubercles, but may extend to the posterior edge of the scale.

Attempts to section the scales were generally unsatisfactory because of the fractured condition of the structures. The bone, cosmine and ganoine layers, however, were observed in several hand-ground preparations. The bony footplate consists of relatively few successive lamelli. Ascending canals are enclosed within this layer posteriorly and centrally, and evidences of the dense bundles of Sharpey's fibers were encountered in all sections. The cosmine layer is apparently very thin, and is indicated to have been disposed in isolated bands posteriorly, although the arrangement of these bands could not be determined. Bone cell spaces are irregularly distributed throughout this and the preceding layer except immediately around the canals, where they appear concentrically arranged. The canal plexus of the cosmine layer is an anastomosing network of irregular radial and longitudinal tubes. The canals lay at different levels. The canalicular system appears densely developed in the longitudinal sections but only sparsely evidenced in the transverse ones. The ganoine is restricted to the ridges of the striations. No ascending canals were found penetrating either the ganoine or the dentine floor of the interspaced grooves.

Remarks.—In determining the currently described fish, a number of Permo-Carboniferous genera were arbitrarily omitted from consideration. These include *Geomichthys*, *Gyrolepidotus*, and *Trachelacanthus*. All are incompletely known fish types for which adequate references are not available to this writer.

Of other genera, this Texas species has been shown to be remarkably similar to the European *Progyrolepis speciosus* in size; the structure of the frontal, maxillary, and mandible; the dentition; and squamation. In fact, the differences between the two species, consisting mainly of variations in the ornamentation of the head bones and scales, are minor. It seems probable, however, that differences of greater magnitude will become apparent when more complete specimens of both are found.

Based on fragmentary material, *Progyrolepis* can be only incompletely defined at this time. In consequence, certain doubts as to the exclusiveness of its definition and to the relationships of the form probably must be still entertained. The genus bears strong resemblances to the elonichthyids, the palaeoniscids, and the pygopteryids. These three families apparently represent the, as yet, quite tentative grouping of a number of closely allied genera whose interrelationships have not been entirely worked out. The combination of morphological features outlined in the foregoing generic characterization is suggestive of an interesting early attainment of the structural condition of the Triassic paleoniscid *Pteronisculus*, and has prompted the present interpretation of structure in support of the recent assignment of *Progyrolepis* to the restricted family Palaeoniscidae (Romer, 1945b).

In conclusion, while certain enticing paleogeographical questions are presented by the occurrence of presumably the same genus almost contemporaneously in both the eastern and western hemispheres, speculation on the points seems useless until the genus is more adequately understood.

REFERENCES

ALDINGER, H. *Permische Ganoidfische aus Ostgrönland.* Medd. Grønland **102** (3): 1–392, figs. 1–105, pls. 1–44. 1937.

CASE, E. C. *A new palaeoniscid fish,* Eurylepidoides socialis, *from the Permo-Carboniferous of Texas.* Contr. Mus. Geol. Univ. Michigan **4**: 275–277, 1 fig. 1935.

DUNKLE, D. H. *A new palaeoniscid fish from the Texas Permian.* Amer. Journ. Sci. **237**: 262–274, 2 figs., 1 pl. 1939.

FRITSCH, A. *Fauna der Gaskohle und der Kalksteine der Permformation Böhmens* (1): 31. 1883.

———. *Fauna der Gaskohle und der Kalksteine der Permformation Böhmens* **3** (2): 118–120 fig. 308, pls. 131–132. 1893.

HUSSAKOF, L. *The Permian fishes of North America.* Publ. Carnegie Inst. Washington, no. 146: 155–175, figs. 53–56, pls. 26–32. 1911.

NIELSON, E. *Studies on Triassic fishes from east Greenland. I.* Glaucolepis *and* Boreosomus. Palaeozool. Groenlandica **1**: 1–403, 30 pls. 1942.

ROMER, A. S. *The late Carboniferous vertebrate fauna of Kounova (Bohemia) compared with that of the Texas Redbeds.* Amer. Journ. Sci. **243**: 417–442. 1945a.

——— *Vertebrate paleontology,* ed. 2: viii +687, 377 figs. Chicago, 1945b.

STENSIÖ, E. A. *Triassic fishes from Spitzbergen. Pt. I:* xxviii+307, 87 figs., 35 pls. Vienna, 1921.

WATSON, D. M. S. *The structure of certain palaeoniscids and the relationships of that group with other bony fishes.* Proc. Zool. Soc. London 1925: 815–870, figs. 1–30, pls. 1, 2. 1925.

WHITE, E. I., and J. A. MOY-THOMAS. *Notes on the nomenclature of fossil fishes. Pt. II. Homonyms D-L.* Ann. Mag. Nat. Hist., 98–103. 1940.

WOODWARD, A. S. *Catalogue of the fossil fishes in the British Museum (Natural History). Pt. II*: xliv+567, 58 figs., 16 pls. London, 1891.

ICHTHYOLOGY.—Gila cypha, *a remarkable new species of cyprinid fish from the Colorado River in Grand Canyon, Arizona.*[1]

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The fish fauna of the vast Colorado River Basin of western North America is the least well known of the major drainages of the West. Our knowledge of the ichthyology of this river began with the surveys during the middle of the last century by Captain Sitgreaves, the Pacific Railroad Surveys, and by the United States and Mexican Boundary Survey. Since that time, however, only one of its major tributaries, the Gila River of southern Arizona, has been moderately well explored throughout for fishes, and even in that comparatively small watershed the job is incomplete. The greater portion of the Colorado remains virtually untouched.

In the narrow and barren inner gorge of the Grand Canyon, the Colorado River is a swift, silt-laden stream, subject to intense floods. It thus provides a habitat that fishes of usual body form can not resist, and a type of environment that has remained unexplored by collectors. While I was exam-

[1] Published by permission of the Secretary of the Smithsonian Institution. Received November 8, 1946.

ining the fish collection at Grand Canyon National Park in the fall of 1942, a single specimen obtained from this part of the Colorado River caught my attention. Subsequent study has shown it to be of unusual interest in possessing remarkable adaptations for life in torrential waters, and the specimen is now the holotype of the novelty described below.

No fewer than 12 nominal species referrable to the genus *Gila* have been attributed to the Colorado River fauna (Jordan, Evermann, and Clark, 1930, pp. 114, 119). Information now at hand indicates that no more than two species, *Gila robusta* and the novelty recognized herein, are known to inhabit the basin. None of the described forms has attained the extremes of specialization and the bizarre appearance of this new species.

Genus **Gila** Baird and Girard

Gila cypha, n. sp.

FIG. 1

Diagnosis.—A strongly compressed *Gila* with the sides of the body slightly convex and with a prominent abrupt hump over the occiput; body almost entirely devoid of scales (except for about 80 in lateral line) which have basal radii; fins expansive, falcate; snout fleshy; mouth inferior; eye very small.

Holotype.—The holotype (U.S.N.M. no. 131839) is a specimen about 305 mm in standard length and was taken by N. N. Dodge near Phantom Ranch in the western end of Grand Canyon National Park, Arizona. It was caught in swift water on hook and line, presumably in the nearby Colorado River at or near the mouth of Bright Angel Creek.

Nontypes.—A specimen (U.S.N.M. no 20083) in fair condition, but lacking data, is referred to the new species, and it is very reasonable to assume that it came from the Colorado River drainage, for cyprinid fishes of this type are known only from that basin. It is compared with the holotype in Table 1. Another specimen (U.S.N.M. no. 15349), represented only by the head, nape, and pectoral fins, and likewise without locality data, also is referred to the new species, for it bears the prominent, abrupt hump which is believed to characterize *G. cypha*.

Description.—The form and coloration of *Gila cypha* are portrayed in Fig. 1, and the proportional measurements are given in Table 1. The following description is of the holotype. Fin rays: Dorsal iii, 9, the first full-length ray unbranched and preceded by 3 graduated, rudimentary rays, the first one very small; anal iii, 11, the first full-length ray unbranched and preceded by 3 graduated, rudimentary rays; pectoral rays 18 in each fin; pelvic rays 9 in each fin; principal caudal rays 20, 18 branched plus a full-length unbranched ray above and below.

Scales in lateral line about 80, embedded and only slightly imbricated anteriorly and becoming more embedded and less imbricated posteriorly until those on the caudal peduncle are scarcely evident (drawn too clearly in Fig. 1). Scales above the lateral line deeply embedded and, for the most part, completely isolated from one another, not evident above the level of the base of the nuchal hump. Scales below the lateral line similar to those above, not evident below the base of the pectoral fin except in the region behind the pectoral fin. Back, breast, and belly completely devoid of scales. Dorsal and ventral surfaces of caudal peduncle completely smooth and scaleless, about three or four irregular rows of embedded scales above and below the lateral line anteriorly which taper off to only one or two such rows above and below the lateral line posteriorly. In degeneration of squamation, *Gila cypha* is closely approached by *Gila robusta elegans* Baird and Girard and, to a lesser extent, by *Gila robusta seminuda* Cope and Yarrow (herein tentatively recognized); the new species is exceeded in this feature by two unrelated genera of cyprinids, *Plagopterus* Cope and *Meda* Girard, in which scales are usually completely lacking. Other Colorado River fishes, such as the cyprinids *Ptychocheilus lucius* Girard and *Tiaroga cobitis* Girard, and the catostomid *Xyrauchen texanus* Abbott, also have lost some of their scales. This desquamation appears to have taken place in response to adaptation to a swift-water habitat, making the body surfaces smoother and thereby reducing friction. Most of these fishes also have well-streamlined bodies.

Total gill rakers nine on the left side, 11 on the right, short and dimorphic; those (two or three) on the upper limb and the one at the angle of the arch are slender, pointed, and

curved at the tip, whereas those on the lower limb are shorter and thicker and all but the most anterior ones are variously forked. All the rakers are attached anteriorly to the gill arch by a broad membrane. Pseudobranchiae weakly developed.

Dental formula 2, 5–4, 1?, three teeth (1 in main row, 2 in lesser row) missing on the left arch and one tooth (in main row) missing from the right arch, with the definite possibility that there is also one tooth missing from the lesser row of this arch (if so, the formula would be 2,5–4,2 as usual in *Gila*). The teeth in the main row are thick, especially toward the base, bluntly pointed, with a weak grinding surface on the first two. No doubt the teeth were modified during the lifetime of the fish, as is characteristic in cyprinid fishes. The only tooth remaining on the lesser row (right arch) is well developed, conical, and bluntly pointed.

The pharyngeal arches are unusually small for a fish the size of the holotype (approximately 305 mm, standard length). The total length of each arch, measured from the apex of the upper limb to the tip of the lower limb, is only 21.8 mm (left arch) and 22.7 mm (right arch). The total lengths of the arches of the largest cotype of *Gila robusta* Baird and Girard (=*G. r. robusta*, U.S.N.M. no. 246,[2] approximately 305 mm long) are 31.8 (left arch) and 32.6 (right arch)—10 mm. longer than the specimen of *Gila cypha* of the same length. In *cypha* the upper and lower limbs of each arch (measured from the base of the first and last teeth of the main row) are almost exactly equal, whereas in the cotype of *robusta* the lower limb of each arch is slightly longer. Both the upper and lower limbs are thicker in *cypha* than in the cotype of *robusta*. In U.S.N.M. no. 20083, tentatively referred to *cypha* (see discussion under Nontypes and Table 1), the total length of each arch is likewise short: 21.7 (left) and 21.2 (right), with the standard length of the specimen approximately 315 mm. Unfortunately, the pharyngeals of the only other specimen referred to the new species (a head, U.S.N.M. no. 15349, see under Nontypes) are missing.

In size and shape, the pharyngeals of the new species much more closely approach those of *G. robusta elegans*. In the type of *elegans* (U.S.N.M. nos. 251 and 20079,[3] a fish about 245 mm long) the total length of the left arch is 20.5 mm or about one-twelfth the standard length, as compared with about one-fourteenth this distance in the holotype of *cypha*. As in the new species, the two limbs of the arch are equal. The main difference between the left arch of *elegans* and that of *cypha* lies in the greater curvature of the upper limb and particularly the more compressed form of the lower limb in *elegans*. Thus the least width of the lower limb divided into the total length of the arch gave ratios of 1.5 (type) and 1.4 (U.S.N.M. no. 45404, see Table 1) in *elegans* as compared with ratios of 0.9 (holotype) and 1.2 (U.S.N.M. no. 20083) in *cypha*.

In coloration the holotype of *Gila cypha* (originally preserved in formalin, in which it remained for some time) is brownish—pinkish brown on the sides and belly and yellowish brown along the back. On close examination, most of the head, back, and sides above the level of the lateral line are densely covered with dark puncticulations; these extend below the lateral line in the region above and behind the pectoral base and near the base of the caudal fin. The same pigmentation occurs near the base of the first pectoral ray (left fin particularly), and also near the bases of the interradial membranes of the dorsal and caudal fins.

The following measurements were stepped off with a pair of precision dividers under a magnification of about 2½ times. Body depth in standard length, 4.25; head length in standard length, 4.1; head depth in head length, 1.5; head width in head length, 1.7; length of caudal peduncle about 3.3 in standard length; least depth of caudal peduncle in head length, 4.8, in base of dorsal, 2.8; length of snout in head length, about 2.7; eye in head, about 13.0, in least depth of caudal peduncle, about 3.0; dorsal and anal bases equal, 1.6 in head; length of pectoral almost equal to that of

[2] JORDAN and EVERMANN, 1896, p. 227, erred in giving the type the numbers 276, and 277 (which are codfish, according to the National Museum register).

[3] Reentered by error as U.S.N.M. no. 20079. Jordan and Evermann, 1896, p. 227, wrongly cited nos. 935 and 20265 as the type, Major Thomas as collector, and included the Colorado and Gila Rivers in the type locality. The single specimen was collected by Dr. Woodhouse in the Zuni River, N. Mex., a tributary of the Little Colorado River.

head; length of pelvic 1.4 in head length; length of longer (upper) caudal lobe much greater than head length and about 3.3 in standard length.

The only other entire specimen believed to represent *Gila cypha* (U.S.N.M. no. 20083, Table 1) differs principally from the holotype of *cypha* in having a deeper body (greatest depth about 3.7 rather than 4.25 in standard length), a larger eye (10.6 in head and 2.5 in least depth of caudal peduncle, rather than 13.0 and 3.0), and a somewhat greater extent and better development of squamation. The scales above the lateral line are particularly less degenerate in this specimen than in the holotype, though they are embedded and are posteriorly isolated from each other (as nearly everywhere in the type). They are developed up to about a level with the middle (rather than the base) of the nuchal hump. Below the lateral line the scales are only very slightly better developed than in the holotype As in that specimen, the back, breast, and belly are devoid of scales except for a few exceedingly minute and deeply embedded ones scattered at random over the back, particularly anteriorly. The dorsal and ventral parts of the caudal peduncle are also smooth and lack scales, except for a few minute remnants. There are about six or seven (rather than three or four) irregular rows of embedded scales anteriorly above and below the lateral line along the caudal peduncle which taper off to three or four (rather than one or two) nearly indistinguishable rows posteriorly. The other differences in measurements (Table 1) between this specimen and the holotype of *cypha* lie within the expected range of intraspecific variation.

Comparisons.—*Gila cypha* obviously belongs to the subgenus *Gila*, as recently tentatively defined (Miller, 1945, p. 104), even though its small scales, which lack a basal shield, have basal radii in addition to apical and lateral radii; the teeth are 2,5–4,2 (in U.S.N.M. no. 20083; perhaps only 2,5–4,1 in holotype), and the dorsal origin is behind the insertion of the pelvic fins. The only other species of this subgenus which I now recognize from the Colorado drainage is *G. robusta* Baird and Girard. In the paper cited above, I listed *Gila elegans* Baird and Girard separately, with the suggestion (long ago advocated by Dr. Carl L. Hubbs) that it probably represents an ecological subspecies of *robusta*. I am convinced that *robusta* and *elegans* are only subspecifically separable, for the five types of *Gila seminuda* Cope and Yarrow (U.S.N.M. no. 16975) seem to close the gap between those nominal species (Table 2). It is therefore necessary to compare *cypha* only with *robusta*, *minacae* Meek, and *nigrescens* (Girard), the other species of the subgenus *Gila*.

The new species differ sharply from those three species and from all of the subspecies of *robusta* (as tentatively diagnosed in Table 2), except *r. elegans*, in having very degenerate squamation, expansive falcate fins, a dorsoventrally flattened head, an inferior mouth and a long fleshy snout. In these features *cypha* is closely approached by *G. r. elegans*,

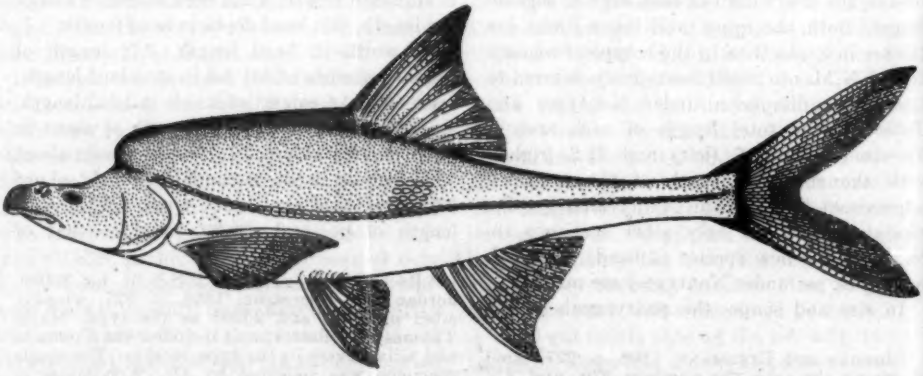


FIG. 1.—*Gila cypha*, n. sp.: Holotype (U.S.N.M. no. 131839), 305 mm in standard length. Drawn by Mrs. A. M. Awl.

the swift-river representative of the *robusta* series commonly called "bony-tail" because of the hard, pencil-shaped caudal peduncle. The most conspicuous difference between *cypha* and *r. elegans* is the prominent nuchal hump for, although I have examined 80 specimens of *elegans* from the lower Colorado River (Grand Canyon to Baja California), representing yearling to very large adults (up to 385 mm standard length), none of these has shown more than a broad, even convexity in the nuchal region. The degeneration and disappearance of the scales is far more advanced in *cypha* than in typical *elegans* for in the "bony-tail" only the back, breast, belly, and upper and lower surfaces of the caudal peduncle may be naked, whereas most of the body and nearly the entire peduncle are naked in the holotype of *cypha*. The scales of *G. r. elegans* also seem to lack basal radii, for in 26 specimens examined for this character I found only apical and lateral radii developed. The scales examined were taken from the region just above or below the lateral line, directly above the base of the pelvic fins, preferably on the right side of the body.

Comparative measurements between *cypha* and *G. r. elegans*, given in Table 1, indicate strong to slight differences in certain features. The reliability of these data, however, is lessened by the few specimens involved and perhaps also by the possibility of sex-correlated characters. The deeper but narrower body and head, slightly longer snout, smaller eye, and greater distance between the origin of the anal fin and the base of the caudal fin in *cypha* are characters which probably do not show sex dimorphism. The greater size of all of the fins in this species, however, as compared with *elegans*, might be solely an expression of maleness. On the other hand, the more expansive fins may be the result of adaptation to swift water, thus providing the species with stronger appendages for resisting the current. It is indeed unfortunate that the body cavities of the two specimens of *G. cypha* are eviscerated,

TABLE 1.—PROPORTIONAL MEASUREMENTS OF GILA CYPHA AND GILA ROBUSTA ELEGANS

Character	*Gila cypha*		*Gila robusta elegans*[1]		
	Holotype	U.S.N.M. 20083	U.S.N.M. 45404	U.S.N.M. 936	U.S.N.M. 76386
Standard length, mm.	305±	315±	318±	325±	338±
Measurements in thousandths of the standard length:					
Dorsal origin to tip of snout	479	487	465	485	484
Pelvic origin to tip of snout	409	429	409	405	426
Anal origin to caudal base	441	422	419	408	424
Body, greatest depth	239	276?	222	199	185
Greatest width	117	131?	154?	150	140±
Head, length	237	237	243	228	239
Depth	160	169	131	114	129
Width	127	129	151	143	151
Caudal peduncle, length	298	276	259	289	294
Least depth	50	51	44	37	37
Interorbital, least bony width	83	85	89	85	84
Opercle, greatest length	74	70±	73	72	73
Snout, length	85?	89	79	73	81
Eye, length	19	24?	29	25	25
Orbit, length	26±	31?	33	31	32?
Mouth, width	89?	101?	92?	85	95?
Upper jaw, length	89	102	86	78	86
Mandible, length	87	89	90	83	89
Dorsal fin, depressed length	225	220?	214	204	201
Basal length	145	151	141	138	134
Anal fin, depressed length	221	211	186	181	187
Basal length	144	140	146	125	134
Middle caudal rays, length	87	90?	93	80	—
Upper caudal lobe, length	305±	—	247?	226	—
Pectoral, length	225	219	201	192	198
Pelvic, length	176	183	157	150	148
Sex	?[2]	?[2]	♀?	♀	♀

[1] Material from the lower Colorado River at and near Yuma, Ariz.
[2] Eviscerated.

making positive sex determination impossible.

The *Gila robusta* complex provides a fine example of correlation between ecology and morphology (Table 2). This remarkable correlation can only receive passing notice at this time for the problem has not been studied in detail and much more material, especially from the main Colorado, is needed. The small tributary and brook subspecies, *intermedia*, has a chubby body with comparatively large scales, small and rounded fins, and a comparatively deep caudal peduncle. The large tributary and smaller river form, *robusta*, has a more streamlined body with smaller scales, larger and slightly falcate fins, and a more slender caudal peduncle. The swift river-channel subspecies, *elegans*, is extremely well streamlined, with embedded scales (often absent on back and elsewhere) forming little resistance to the current, expansive and strongly falcate fins (caudal fulcra excessively developed), and a terete, pencil-shaped caudal peduncle.

The apparent end form of this series seems to be represented by the highly specialized *Gila cypha*, which, on the basis of the inadequate material at hand, cannot be aligned as a subspecies of *robusta*. If the trend in characters from *intermedia* to *elegans* shown in Table 2 continued beyond the *elegans* level, the next form would be expected to have at least 11 dorsal rays and a narrower caudal peduncle than *elegans*. The two specimens of *G. cypha* have, unexpectedly, only nine dorsal rays, and the caudal peduncle is deeper than it is in *elegans* (Tables 1 and 2). Moreover, the scales of the new species bear basal radii whereas those of *elegans* have only apical and lateral radii. In this character, *cypha* agrees with the otherwise very different looking *G. r. intermedia*. Both *G. cypha* and *G. r. elegans* occur in the main Colorado River although the precise ecologic niche for each form has not been determined. The scanty available data indicates that *elegans* collects at the mouths of the clear

TABLE 2.—PROVISIONAL COMPARISON BETWEEN SUBSPECIES OF GILA ROBUSTA AND GILA CYPHA[1]

Character	Subspecies of *G. robusta*				*G. cypha* (2 specimens)
	intermedia[2]	*robusta*[2]	*seminuda*[2]	*elegans*[4]	
Dorsal rays	8 (rarely 7 or 9)	9 (rarely 8 or 10)	9 or 10	10 or 11	9
Anal rays	8 (7–9)	9 (rarely 7, 8 or 10)	9 or 10	10 or 11	10 or 11
Pelvic rays	8–8 (frequently 9–9)	9–9 (rarely 10–10)	9–9 or 10–10	9–9 (rarely 10–10)	9–9
Scales	Fully scaled; 65–87 in lateral line; basal radii usually present	Fully scaled; 70–96 in lateral line; basal radii infrequent (rarely well developed)	Back, breast and belly naked in some; 77–89 in lateral line; 2 out of 5 with very faint basal radii	Back, breast, belly and much of caudal peduncle often naked or with minute, deeply-embedded scales; 75–88 in lateral line; no basal radii	Most of body naked; 77–80 in lateral line; basal radii moderately to well-developed
Nuchal hump	Absent	Slightly arched in very large fish[5]	Absent in material examined[3]	Moderate to high but evenly arched in larger specimens	Prominent, truncate anteriorly
Least depth of caudal peduncle into head length	2.6–3.4	3.3–4.3	4.1–5.2	5.0–6.5	4.6–4.7

[1] The counts and measurements recorded here for the subspecies of *robusta* have been jotted down over a period of five years during routine identification and examination of collections from the Colorado River drainage.

[2] Material from the Gila River Basin only.

[3] Based on the five types, 90 to 128 mm in standard length, U.S.N.M. no. 16975, which may be regarded either as intergrades between *robusta* and *elegans* or as an intermediate subspecies (as tentatively done above, as also by Ellis, 1914, p. 57).

[4] Material from the Middle and Lower Colorado only (Little Colorado to mouth of Colorado).

[5] Exaggerated in the drawing of one of the types of *G. robusta* (U.S.N.M. no. 246, largest fish) shown in Sitgreaves (1853, pl. 1, fishes).

tributaries and it has been taken some distance up the larger tributaries.

Habitat and associates.—Some conception of the rate of flow of the swift, silty Colorado River can be gained by records of the gauging station approximately 240 miles below Grand Canyon. Over the period 1917 to 1926, this rate varied between 1,800 and 174,000 cubic feet per second, with a variation between low and high water stages of about 25 feet (Thompson, 1929, p. 733). Dangerous rapids are interspersed throughout the Colorado River, especially in the Grand Canyon region, and have proved treacherous, and often disastrous, barriers to explorers of the river. Because of the scouring action of the river no vegetation can exist.

Judged from its large, falcate fins, specialized nuchal hump, inferior mouth, and dorsoventrally flattened head, *Gila cypha* is well adapted for life in the swift current very near or on the bottom. The action of the current against the prominent nape tends to force the fish down toward the bottom or the sides, where the flow is not so torrential as in midwater. The small eye may represent a degeneration correlated with reduced light due to the excessive silt, or it may be a response to the direct effect of the scouring action of the suspended matter, or both.

No scientific survey of the fishes of Grand Canyon National Park has been undertaken, but fish have been caught occasionally by angling and these few specimens (deposited in the Park collection) give an idea of the associates of *Gila cypha*. Among them are the humpback sucker, *Xyrauchen texanus* (Abbott), the mountain sucker, *Pantosteus delphinus* (Cope), *Gila robusta elegans* Baird and Girard, and the introduced channel catfish, *Ictalurus lacustris punctatus* (Rafinesque). Two others are to be expected in the main river as both occur elsewhere in the Colorado and are adapted for channel life: the flannelmouth sucker, *Catostomus latipinnis* Baird and Girard, and the Colorado squawfish or "salmon," *Ptychocheilus lucius* Girard, reputed to be the largest cyprinid fish in the New World (Jordan and Evermann, 1896, p. 225).

Range.—*Gila cypha* is known definitely only from the Grand Canyon near the mouth of Bright Angel Creek. The only other specimens referred to the new species are without locality data. The species may be found to be common in the main channel of the Colorado in Grand Canyon when that swift-water habitat is thoroughly collected. It may not occur below Boulder Dam, for I have seen a number of collections from that area and all the *Gila* therein are referable to *G. r. elegans*.

Etymology.—The specific name *cypha*, suggested by Dr. Carl L. Hubbs, is from the Greek κυφή, meaning hump-backed, in reference to the striking nuchal hump.

Acknowledgments.—It is a pleasure to thank the authorities of Grand Canyon National Park, and particularly Park Naturalist Louis Schellbach, for allowing me to describe this novelty and for donating the holotype to the U. S. National Museum. Through the efforts of Mr. Schellbach a start has been made on a check-list of the fishes of the Park, and some of this material has been included in the present report.

LITERATURE CITED

ELLIS, MAX MAPES. *Fishes of Colorado.* Univ. Colorado Studies 11 (1): 1–136, 1 fig., 12 pls., 3 maps. 1914.

JORDAN, DAVID STARR, and EVERMANN, BARTON WARREN. *The fishes of North and Middle America.* U. S. Nat. Mus. Bull. 47, pt. 1: lx+1240 pp. 1896.

JORDAN, DAVID STARR; EVERMANN, BARTON WARREN; and CLARK, HOWARD WALTON. *Check list of the fishes and fishlike vertebrates of North and Middle America north of the northern boundary of Venezuela and Columbia.* U. S. Comm. Fish. Rep. for 1928, pt. 2: iv+670 pp. 1930.

MILLER, ROBERT RUSH. *A new cyprinid fish from southern Arizona, and Sonora, Mexico, with the description of a new subgenus of* Gila *and a review of related species.* Copeia, 1945: 104–110, pl. 1. 1945.

SITGREAVES, LORENZO. *Report of an expedition down the Zuni and Colorado Rivers:* 1–198, 77 pls. 1 map. Washington, 1853.

THOMPSON, DAVID GROSH. *The Mohave Desert region, California.* U. S. Geol. Surv. Water Supply Paper 578: xi+759 pp., 20 figs., 34 pls. 1929.

BOTANY.—*Spot anthracnoses in the Pacific Coast States.*[1] ANNA E. JENKINS, U. S. Bureau of Plant Industry, Soils, and Agricultural Engineering, A. A. BITANCOURT, Instituto Biologico, São Paulo, Brazil, and FLORA G. POLLACK, U. S. Bureau of Entomology and Plant Quarantine.

A summary of the distribution of spot anthracnoses[2] in the United States, prepared in 1938 (*6*) showed that five of these diseases had been recorded in the Pacific Coast States (Washington, Oregon, and California), viz:

(1) anthracnose of grape (*Vitis*), caused by *Elsinoë ampelina* (DBy) Shear;
(2) anthracnose of brambles (*Rubus*), caused by *E. veneta* (Burk.) Jenkins;
(3) anthracnose of snowberry (*Symphoricarpos*), caused by *Sphaceloma symphoricarpi* Barrus and Horsfall;
(4) anthracnose of rose (*Rosa*), caused by *S. rosarum* (Pass.) Jenkins;
(5) anthracnose of Labrador-tea (*Ledum*), caused by *E. ledi* (Pk.) Zeller.

All five diseases were known in Oregon and all but snowberry anthracnose and rose anthracnose in Washington. The exception for California was grape anthracnose, and the absence of this disease in that state has since been commented upon by Smith (*11*). The existence of gray scab of willow in California has been traced (*3*) by virtue of the presence of typical lesions of the diseases on herbarium specimens of *Salix lasiolepis* Benth. collected in Humboldt County (1933), Santa Clara County (1904), and San Diego County (1931). This disease was recognized as a spot anthracnose in 1943 (*9*) and its pathogene named *S. murrayae* Jenkins and Grodsinsky (*3*, p. 56) in honor of its discoverer.

Additional records of spot anthracnoses in the Pacific Coast States now available are assembled in this article, and in four instances their pathogenes are described as new. Findings in western Washington and Oregon are based on specimens emanating from the Special Survey in the General Vicinity of Ports of Entry of the U. S. Bureau of Entomology and Plant Quarantine (1943–45). These were referred to Jenkins because of their apparent spot anthracnose nature, and where identification or corroboration was sufficiently positive at the time they were reported in Field's *Summary of the more important plant diseases taken in connection with the . . . Survey . . .* (*1*). The spot anthracnose on salal (*Gaultheria shallon* Pursh), however, came to attention only in 1946, during routine examination of the particular Special Survey specimen concerned, by Pollack, recent coauthor in the description of a new species of *Elsinoë* (*10*). The new records of spot anthracnoses in southern California are afforded by specimens collected in that part of the state in 1942 by H. S. Fawcett and A. A. Bitancourt, together with certain specimens communicated to the first two writers by Fawcett.

As a result of the Special Survey, rose anthracnose was found in Pacific County, Wash. (*1*, 29, p. 182) and gray scab on Pacific willow (*Salix lasiandra* Benth.) both in Pacific County, Wash. (*1*, 28, p. 274; *5*) and in Clatsop County, Oreg.

Of particular significance was the discovery in western Washington and Oregon of a spot anthracnose not previously known in the United States, namely, anthracnose of pome fruits (*7*, *8*). The single finding on quince from Washington of what appears to be this disease (*8*) had been preceded by an earlier discovery in Brazil not previously reported. At Campinas, São Paulo, in June 1939, Bitancourt discovered presumably the same leaf spot on quince leaves, and isolated the pathogene. Following the initial discovery of this spot anthracnose in the Pacific Northwest, the Emergency Plant Disease Survey of the Bureau of Plant Industry, Soils, and Agricultural Engineering cooperated in a further search for this disease in western Washington and Oregon. The several counties in these states in which the disease was found during 1943–44 are indicated on a map (*8*).

Thus far anthracnose of pome fruits has

[1] Received November 5, 1946.
[2] Term adopted for collective reference to diseases caused by *Elsinoë* and *Sphaceloma*.

been reported only on leaves but in the case of apple also on fruit. An example of twig attack is available through a Brazilian interception of a diseased apple twig from Portugal, made in Santos, State of São Paulo, in 1932, by J. D. Deslandes. The specimen in question was identified by Bitancourt who found the perfect stage of

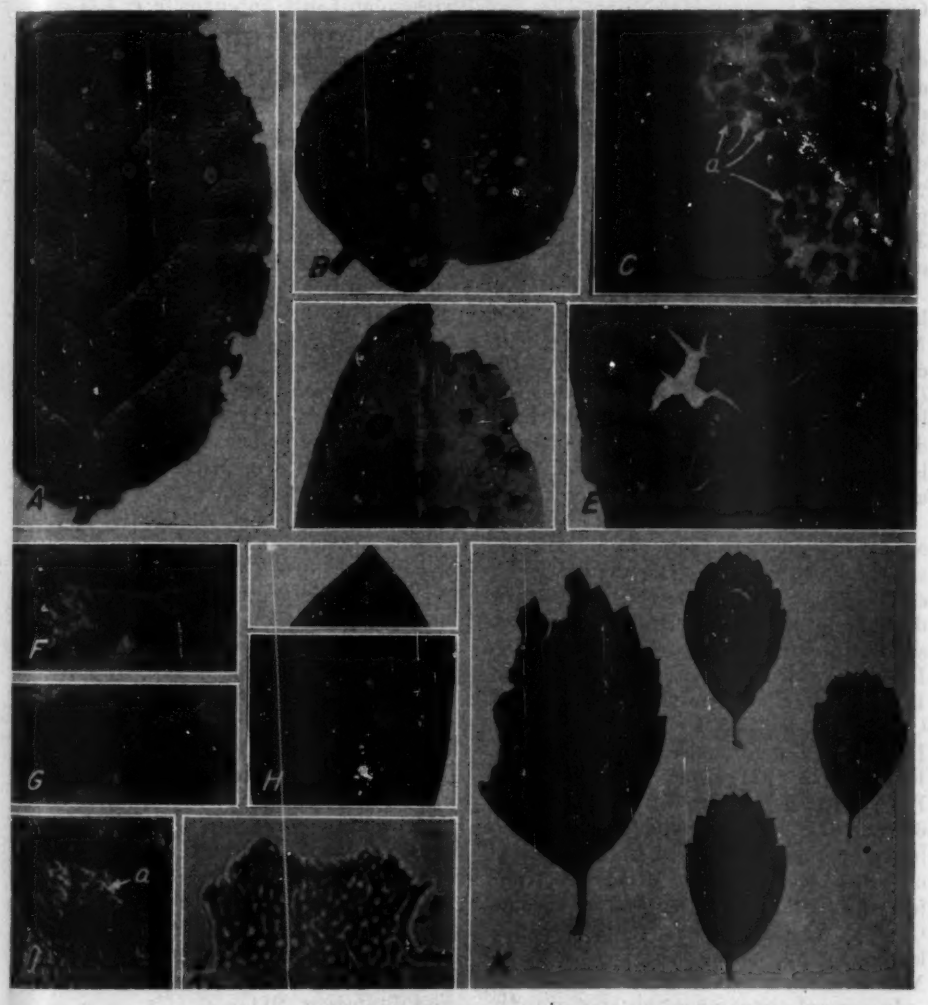


FIG. 1.—A–C, Lesions on *Gaultheria shallon* from western Washington: A, *a*, light-colored spots on upper leaf surface caused by *Elsinoë*, apparently *E. ledi*; *b*, dark spots caused by *Phyllosticta gaultheriae*, Special Survey collection, 1945, ×1. B, C, *Elsinoë* leaf spot on the Bartholomew specimen, 1909; B, ×1; *C*, *a*, ascomata, ×12. D–G, Leaf spot on *Arbutus menziesii* caused by *Sphaceloma mattirolianum* (?), specimen collected in California by Fawcett and Bitancourt, 1942; D and E, ×1; F, individual leaf spot from D, ×5; G, reverse of same leaf spot, ×5. H, *Sphaceloma* leaf spot on *Rhododendron macrophyllum*, Special Survey collection in western Washington, 1943, ×1. I, Leaf spot on *Cercocarpus betulifolium* var. *multiflorus* caused by *S. cerocarpi*, specimen collected by Fawcett and Bitancourt in California, 1942, *a*, acervuli, ×10. J, *a*, Fructification of *S. cercocarpi*, *a*, ruptured epidermis, ×500. K, *Cercocarpus* leaf spot, ×1. Photographs by R. L. Taylor (A–C, H), Bitancourt (D–G), and Lillian A. Guernsey (I–K).

the pathogene (*Elsinoë piri* (Woronich.) Jenkins) fruiting on the cankers. Only the conidial stage of the fungus (*Sphaceloma pirinum* (Pegl.) Jenkins) (*8*) was observed on the specimens from Washington and Oregon.

Among new suscepts of spot anthracnoses discovered as a result of the Special Survey are the two ericaceous plants, coast rhododendron (*Rhododendron macrophyllum* G. Don) and salal. In the case of coast rhododendron limited spotting on only two leaves was observed (Fig. 1, H). The collection was made in Skagit County, Wash., on August 31, 1943, and *Sphaceloma* sp. was definitely evident on the lesions.

The specimen on salal examined by Pollack is from Clallam County and is dated May 25, 1945. In addition to the light-colored, purple-margined *Elsinoë* leaf spot (Fig. 1, A, *a*) there is a less distinctive brown leaf spot surrounded by an indefinite discoloration (Fig. 1, A, *b*). This leaf spot is caused by *Phyllosticta gaultheriae* Ell. and Ev.

This same combination of leaf spots or apparently only the more conspicuous *Elsinoë* spot is represented in the Mycological Collections of the Bureau of Plant Industry as Pollack ascertained. Pertinent specimens are the following: Bainbridge Island, Kitsap County, Wash., July 23, 1909, E. Bartholomew (E. Barth. Fungi Columbiani no. 3160) (Fig. 1, B and C); Lake Isobel, Snohomish County, Wash., February 22, 1931, W. H. Wheeler; Grants Pass, Oreg., September 5, 1916, J. R. Weir 688 and 691. A fifth specimen of the *Elsinoë* found in the Mycological Collections and only now recognized as of that genus, transfers the first known record from Clallam County, Wash., to August 7, 1929. The collector of this earlier specimen is E. P. Meinecke.

In general appearance this spot anthracnose on *Gaultheria* resembles that of *Ledum*. In either case the *Elsinoë* produces the perfect stage abundantly and there is a similarity in the fructifications. Microscopic comparison of the *Elsinoë* on *Gaultheria* with an authentic specimen of *E. ledi* showing mature spores revealed no appreciable difference in the two species. Incidentally, the presence of muriform spores in *E. ledi* is mentioned here, as they are not noted in Zeller's (*12*) revised description of this species. On the basis of this favorable comparison with *E. ledi*, the *Elsinoë* on salal is identified for the present at least as that species. It remains to be determined, of course, whether the *Elsinoë* from either suscept is capable of infecting the other.

Among the findings of spot anthracnoses in southern California were those on the ericaceous genus *Arbutus*. On May 21, 1942, in the Santa Ana Botanical Gardens, Orange County, Fawcett and Bitancourt observed a prominent leaf spot on *A. menziesii* Pursh (Fig. 1, D–G), from which *Sphaceloma* was isolated by Bitancourt. This disease is identified tentatively at least as identical with anthracnose on leaves of strawberry-tree (*A. unedo* L.) caused by *S. mattirolianum* (Sacc. and D. Sacc.) Jenkins (*4*). What is evidently this disease of strawberry-tree was observed at Riverside, Riverside County, Calif., by Fawcett in January 1944. To the writers' knowledge, these constitute the first records of this particular spot anthracnose in United States. Other spot anthracnoses found in California are those of Catalina cherry (*Prunus lyonii* Sarg.) collected in Santa Barbara March 5, 1936, by M. W. Gardner; hollyleaf cherry (*P. ilicifolia* Walp.), Griffith Park, Los Angeles, October 12, 1939, by H. S. Fawcett, D. E. Bliss, and A. A. Bitancourt (811); and tree tobacco (*Nicotiana glauca* Graham), Ventura County, May 12, 1942, by Fawcett and Bitancourt (911).

FIG. 2.—A, B, Spots on leaves of *Ribes grossularia* caused by *Sphaceloma ribis*, Special Survey collection in Western Washington, 1943; A, ×1; B, ×3½. C, *a*, Acervulus of the *Sphaceloma*, *b*, ruptured epidermis, *c*, hyperplastic host tissue. D–F, Spots on *Viburnum opulus* var. *roseum* (D and F) caused by *S. viburni* (E): D, *a*, dark acervuli on a leaf spot, ×12; F, *a* acervulus, *b*, ruptured epidermis, ×500; F, ×1. G, H, Scab of *Hedera helix* caused by *S. hederae*, from California, 1942, comm. H. S. Fawcett: G, ×1; H, ×12. I–M, *S. hederae* on *H. helix* from North Carolina, Coll. and comm. Westcott: I, *a*, Fructification on a lesion, ×12; J, *a*, dark intraepidermal hyphae giving rise to conidiophores (*b*), *c*, ruptured epidermis; K–M, more mature development of the *Sphaceloma*, *a*, conidiophores, *b*, conidia, ×500. Photographs by Taylor (A, B, D, F, G, H, and I), Guernsey (C), and M. A. Jaeger (E and J–M).

The four remaining spot anthracnoses to be reported here appear to be new to science. Those found as a result of the Special Survey affect gooseberry (*1*, 29, p. 182) and snowball (*1*, 28, p. 970). The distribution of all four diseases will be given below follow-

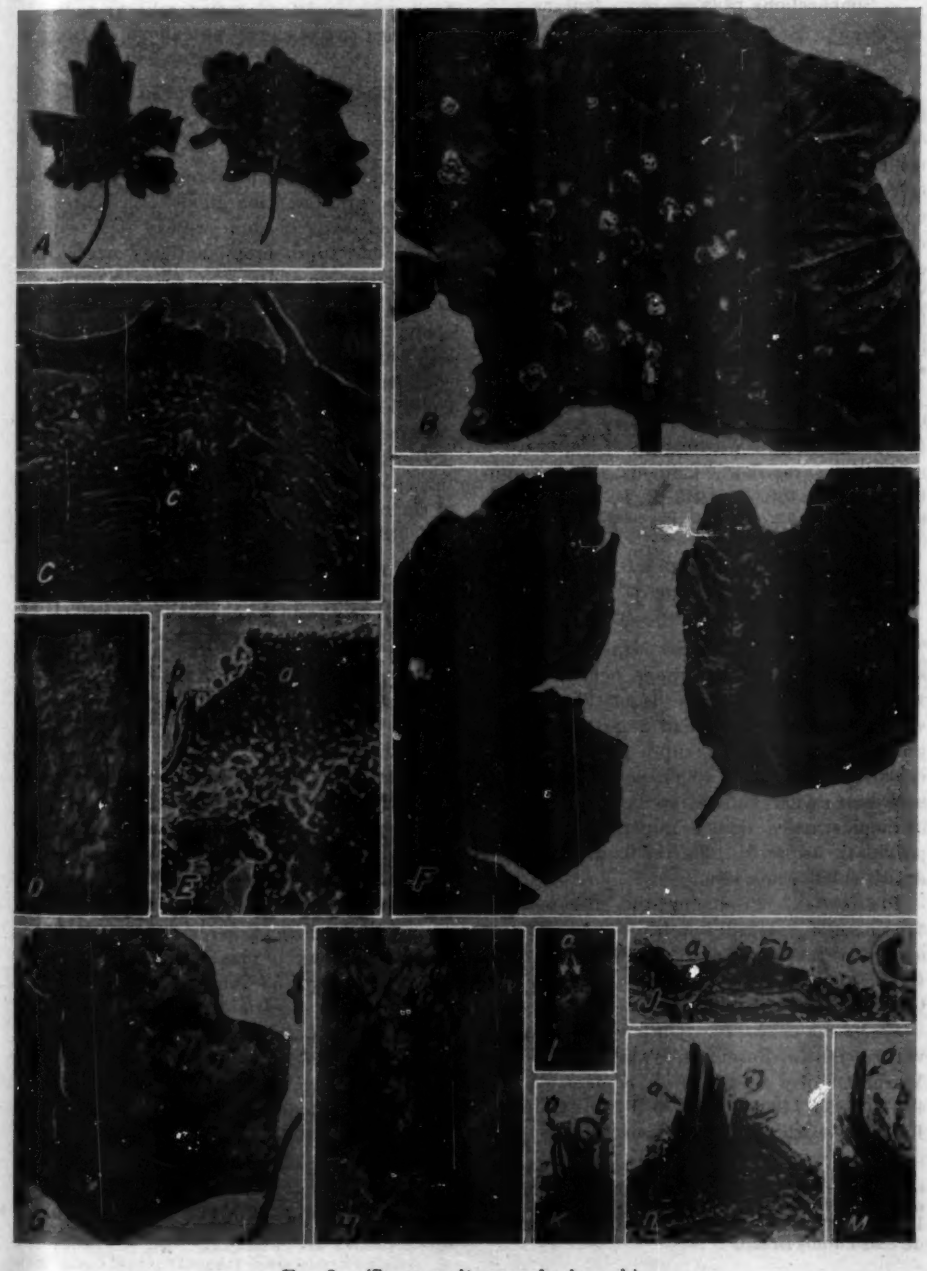


FIG. 2.—(See opposite page for legend.)

ing brief diagnoses of their pathogenes. The translations into Latin were made by Miss Edith K. Cash.

Sphaeceloma ribis sp. nov., Jenkins and Bitancourt
FIG. 2, A–C

Maculae in foliis numerosae, conspersae, interdum in nervis circulares vel sub-circulares, aliquando paucae coalescentes, plerumque usque 1 mm in diam., supra prominentiores elevatae, griseae margine inconspicuo luteo ex acervulis atro punctatae; acervuli intraepidermales, dein erumpentes, usque 63μ in diam. et 40μ crassi; conidiophora obscura, continua vel 1–3 septata, usque 15μ, e stromate pallido oriunda; conidia variabilia, parva, hyalina vel colorata, sphaericalia usque 3μ in diam. ad elliptica, 8×5μ.

Distribution.—Producing the disease "scab of gooseberry" on leaves of *Ribes grossularia* L. (Saxifragaceae) in Washington.

Specimen examined.—Chinook, Pacific County, Wash., October 9, 1943, R. F. Wilbur (Wilbur 53) (USM 74759, IB 4877, Type).[3]

Sphaceloma viburni sp. nov., Jenkins and Bitancourt
FIG. 1, D–F

Maculae in folis paucae usque numerosissimae, dispersae, etiam saepe nervisequentes vel marginales circulares usque triangulares vel irregulares, minutae ad 2 mm diam., vel plus minusve extensae, supra prominentiores, centro griseae usque albae, margine brunneo interdum ex acervulis atropunctatae, acervuli intraepidermales, dein erumpentes, compacti, pulvinati, usque 61–100μ in diam. et 21–50μ crassi; conidia non visa.

Distribution.—Producing the disease "anthracnose of snowball" on leaves of *Viburnum opulus* var. *roseum* L. and *V. suspensum* Lindl. (Caprofoliaceae) in Washington and California.

Specimens examined.—On *Viburnum opulus* var. *roseum* L.: Roseburg, Wakiakum County, Wash., October 8, 1943, F. S. Semans (Wilbur 148) (USM 74690, IB 4679 Type). Chinook, Pacific County, Wash., November 30, 1944, M. J. Forsell (Forsell 1167, 1168, 1169 and 1170).

On *Viburnum suspensum* Lindl.: Riverside, Riverside County, Calif., March 28, 1942, H. S. Fawcett, R. H. Buller, and A. A. Bitancourt 904 (USM 74384, IB 4402).

Sphaceloma cercocarpi sp. nov., Bitancourt and Jenkins
FIG. 2, I–K

Maculae in foliis plus minusve sparse conspersae, interdum marginales, circulares vel sub-circulares, interdum coalescentes, usque 3 mm diam., supra prominentiores, centro pallidae, interdum margine subelevato purpureo; acervuli in area centrali papuliformes, intraepidermales, dein erumpentes, compacti, pallidi, usque 57–60μ lati, 44–70μ crassi, interdum confluentes; stroma valde evolutum, stratum conidiferum pallidum, compactum, 26μ crassum; conidia non visa.

Distribution.—Producing the disease "anthracnose of birch-leaf mahogany" on leaves of *Cercocarpus betulifolius* var. *multiflorus* Jepson (Rosaceae) in California.

Specimen examined.—Santa Ana Botanical Gardens, Orange County, Calif., May 2, 1942, H. S. Fawcett and A. A. Bitancourt 910 (USM 74383, IB 4404, Type).

Sphaceloma hederae sp. nov., Bitancourt and Jenkins
FIG. 2, G–M

Maculae in foliis saepe numerosissimae, conspersae, vel in area una dense aggregatae, circulares vel subcirculares, verruciformes, interdum centro depressae, brunneae, centro pallido vel obscuro, saepe confluentes, infra prominentiores, 1–5 mm in diam., status *Sphaceloma* hyphomycetoideum potius quam acervuloideum; conidiophora ex hyphis intraepidermibus, in caespitibus usque 53–200μ in diam., aggregatis, in longitudinem variabilia, usque 47μ longa, 5.3μ lata, recta vel curvata, plerumque acuta vulgo continua, interdum 3-septata; conidia variabilia parva, hyalina vel colorata, sphaericalia, usque 6μ diam. vel elliptica, continua, ad septata, 2.5–7.8×1.7–5.3μ.

Distribution.—Producing the disease "scab of English ivy" (2) on leaves of *Hedera helix* L. (Araliaceae), in California, North Carolina, and São Paulo, Brazil.

[3] USM = Mycological Collections of the Bureau of Plant Industry, Soils, and Agricultural Engineering, Plant Industry Station, Beltsville, Md. IB = Secção de Fitopatologia, Instituto Biologico de São Paulo, Brazil.

Specimens examined.—Vicinity of Silver Lake, Los Angeles County, Calif., May 28, 1940, R. G. Woglum (comm., H. S. Fawcett). Uplands, San Bernardino County, Calif., about June 1942, H. Cavers (comm. H. S. Fawcett). Mar Vista, Los Angeles County, Calif., March 8, 1943, A. Stein (comm. H. S. Fawcett).

Asheville, N. C., October 18, 1946 (Coll. and comm. C. Westcott) (USM 90270, IB 5101, Type).

São Paulo, Brazil, May 3, 1943, A. A. Bitancourt 972. Isolations were made from two of these specimens, that collected at Mar Vista and that São Paulo by Bitancourt.

LITERATURE CITED

(1) FIELDS, W. S. *Summary of the more important plant diseases taken in connection with the insect and plant disease survey in the general vicinity of ports of entry from June 1943 to December 31, 1944; January 1944 to June 30, 1944; July 1944 to June 30, 1944: January 1945 to June 30, 1945* (U. S. Bur. Ent. and Plant Quar.). U. S. Dept. Agr. Plant Dist. Reptr. **28**: 274–275; 969–970. 1944; **29**: 181–183; 693–697. 1945. Mimeographed.

(2) BITANCOURT, A. A., and JENKINS, A. E. *Scab of English ivy caused by* Sphaceloma. (Abstr.) Phytopathology **33**: 1109. 1933.

(3) GRODSINSKY, L., and JENKINS, A. E. Sphaceloma murrayae *en diversas especies de* Salix. Rev. Argentina Agr. **10**: 55–58, illus. 1943.

(4) JENKINS, A. E. *Additional studies of species of* Elsinoë *and* Sphaceloma. Mycologia **25**: 213–220, illus. 1933.

(5) ———. *Two new records of* Sphaceloma *diseases in the United States.* Phytopathology **34**: 981–983, illus. 1944.

(6) JENKINS, A. E., and BITANCOURT, A. A. Elsinoë *and* Sphaceloma *diseases in the United States, Puerto Rico, and Guam.* (Abstr.) Phytopathology **30**: 14. 1940.

(7) JENKINS, A. E., FORSELL, M. J., and BOYLE, L. W. Elsinoë piri *discovered on apple and pear in western Washington and Oregon.* (Abstr.) Phytopathology **35**: 486. 1945.

(8) JENKINS, A. E., FORSELL, M. J., and BOYLE, L. W. *Identity and known distribution of* Elsinoë piri *in Washington and Oregon.* Phytopathology **36**: 458–461, illus. 1946.

(9) JENKINS, A. E., and GRODSINSKY, L. Sphaceloma *on willow in New Zealand.* Trans. Brit. Mycol. Soc. **26**: 1–3, illus. 1943.

(10) LIMBER, D. P., POLLACK, F. G., and JENKINS, A. E. Elsinoë *discovered on* Sesbania *and* Cinnamomum *in the United States.* Mycologia **38**: 463–472, illus. 1946.

(11) SMITH, R. E. *Diseases of fruits and nuts.* Univ. California. Agr. Ext. Serv. Circ. 120, 168 pp., illus. 1941.

(12) ZELLER, M., and DEREMIAH, J. W. *An anthracnose of* Ledum *caused by a species of* Elsinoë. Phytopathology **21**: 965–972, illus. 1931.

ENTOMOLOGY.—*New species of North and Central American mites of the family Penthaleidae (Acarina).*[1] EDWARD W. BAKER, *U. S. Bureau of Entomology and Plant Quarantine.* (Communicated by ALAN STONE.)

The family Penthaleidae Oudemans, 1931, is composed of four genera, two of which contain species of economic importance.

Essig[2] and Campbell[3] report that *Penthaleus major* (Dugès)[4] is a pest of peas in California and that it feeds on clover, oats, wild mustard, and lupine. Essig has also observed it attacking a springtail, *Achorutes armatus* Nicolet, which was swarming on the surface of ditch water. It has caused serious damage to wheat in certain areas in Texas and has been found on wheat and barley in Arizona and Oklahoma. In Australia this species is a serious pest of clover and vegetable crops,[5] and Andre[6] records it as injurious to peas and lettuce as well as other vegetables in France.

Halotydeus destructor (Tucker) causes extensive damage to vegetable and leguminous crops in Australia and South

[1] Received October 22, 1946.

[2] ESSIG, E. O. California Dept. Agr. Monthly Bull. **28** (7, 8, 9): 507–508, fig. 1. 1939.

[3] CAMPBELL, R. E. California Dept. Agr. Monthly Bull. **30** (3): 312–314. 1941.

[4] *Notophallus dorsalis* Banks, 1902 (Can. Ent. **34**: 172), and *N. viridis* Banks, 1917 (Ent. News **28**: 193), are here considered as synonyms of *Penthaleus major* (Dugès) (new synonymy).

[5] SWAN, D. C. Journ. Agr. Res. South Australia **38**: 365–367. 1934.

[6] ANDRÉ, MARC. Bull. Paris Mus. Hist. Nat. (2) **4**: 284–291. 1932.

Africa,[7,8,9,10] but as far as is known it is not present in North America. A mite identified as *Halotydeus egregius* (Berlese) has been taken from peach-orchard soil in Texas, but as yet this species has not proved to be of economic importance.

The genera *Stereotydeus* and *Penthalodes* are represented in the United States, Mexico, and Panama by the new species described in this paper. These do not appear to be harmful and possibly they are predaceous, but since they belong to a family that contains species of economic importance they are described.

Penthalodes mytilaspidis Riley, as described and figured by McGregor,[11] appears to belong to another family, perhaps the Anystidae.

KEY TO THE GENERA

1. Anal opening not ventral.....2
   Anal opening ventral.....3
2. Anal opening dorsal...*Penthaleus* Koch, 1835
   Anal opening posterior.....
   .....*Halotydeus* Berlese, 1891
3. No V-shaped indentation on dorsum of body
   .....*Stereotydeus* Berlese & Leonardi, 1901
   A V-shaped indentation on dorsum of body..
   .....*Penthalodes* Murray, 1877

Stereotydeus mexicanus, n. sp.

FIGS. 1, 2

Female.—Skin pattern reticulate, forming independent pentagons separated from one another by about their own width on dorsal and lateral surface of mite. On venter of mite between coxae pentagons lacking, only tubercles without pattern present. Palpus strong, segment II especially broad; segment I, 17μ long; II, 67μ long with two dorsal pilose setae; III, 18μ long with three pilose setae; IV, 23μ long with apparently seven small distal setae, one of which appears to be simple and the others pilose. Shield over rostrum trilobed, center lobe pointed, with same pattern as body; median anterior tubercle with a pair of short pilose setae. A pair of pilose sensory setae about 66μ long; other dorsal body setae about 25μ long, pilose. A pair of medium-sized eyes behind lateral propodosomal dorsal setae. Six pairs of long, pilose genital setae, the fourth from the anterior edge of the plate set laterad from the others. Leg setae short, pilose; tarsus I with three sensory organs arranged in a single row. Body rounded posteriorly. Length of body 380μ; including rostral shield 453μ; width about 266μ.

Male.—Similar to female.

The type female. U.S.N.M. no. 1697, was collected at Patzcuaro, Michoacán, Mexico, September 1, 1941, by F. Bonet; a paratype, to be deposited in the collection of F. Bonet, Mexico, D. F., was collected in moss, Orizaba, Veracruz, Mexico, February 21, 1943, by F. Bonet. Other collection records are as follows: On orchid plant, Mexico at Brownsville, Tex., September 27, 1942, by Williamson; in moss, Mount Popocatapetl, Mexico, at about 9,000 feet elevation, December 29, 1942, by E. W. Baker; in moss, Laguna de Zempoala, Morelos, Mexico, January 31, 1943, by E. W. Baker; in moss, Desierto de los Leones, México, Mexico, November 19, 1943, by C. C. Plummer. The following Mexican collections were made by F. Bonet: In moss, Salazar, D. F., September 30, 1942; in mushrooms, Desierto de los Leones, Mexico, July 14, 1941; Nevada de Toluca, Mexico, April 27, 1941; Gruta del Palmito, Bustamante, Nuevo León, July 17, 1942; wood, Orizaba, Veracruz, January 14, 1941; in moss, Cuesta de Acultzingo, Veracruz, January 10 and 16, 1942; Nevada de Colima, Colima, January 20, 1943.

The mite is similar to the Australian species, *Stereotydeus occidentale* Womersley, but it differs in that the dorsal pattern of *S. mexicanus* is composed of minute tubercles, forming pentagons, while that of *S. occidentale* is made up of small uniform tubercles separated by their own diameter; the dorsal setae of *S. mexicanus* are longer; *S. mexicanus* is 453μ long and *S. occidentale* is 650μ long; and the palpal segments of the Mexican species are longer.

Stereotydeus lattimorei, n. sp.

FIG. 3

Female.—Skin pattern not reticulate but composed of tubercles forming longitudinal striations over dorsum of mite, and more or less transverse striations on venter. Palpus short,

[7] JACK, R. W. Agr. Journ. Cape of Good Hope 32: 615–620. 1908.
[8] TUCKER, R. W. E. Union South Africa Dept. Agr. Mem. 3: 23–36. 1925.
[9] NEWMAN, L. Western Australia Dept. Agr. Journ. 2: 469–475. 1925.
[10] NORRIS, K. Austral. Council. Sci. & Indus. Res. Pamphlet 84: 1–23. 1938.
[11] MCGREGOR, E. A. Ann. Ent. Soc. Amer. 9 (3): 284–288, pl. 13. 1916.

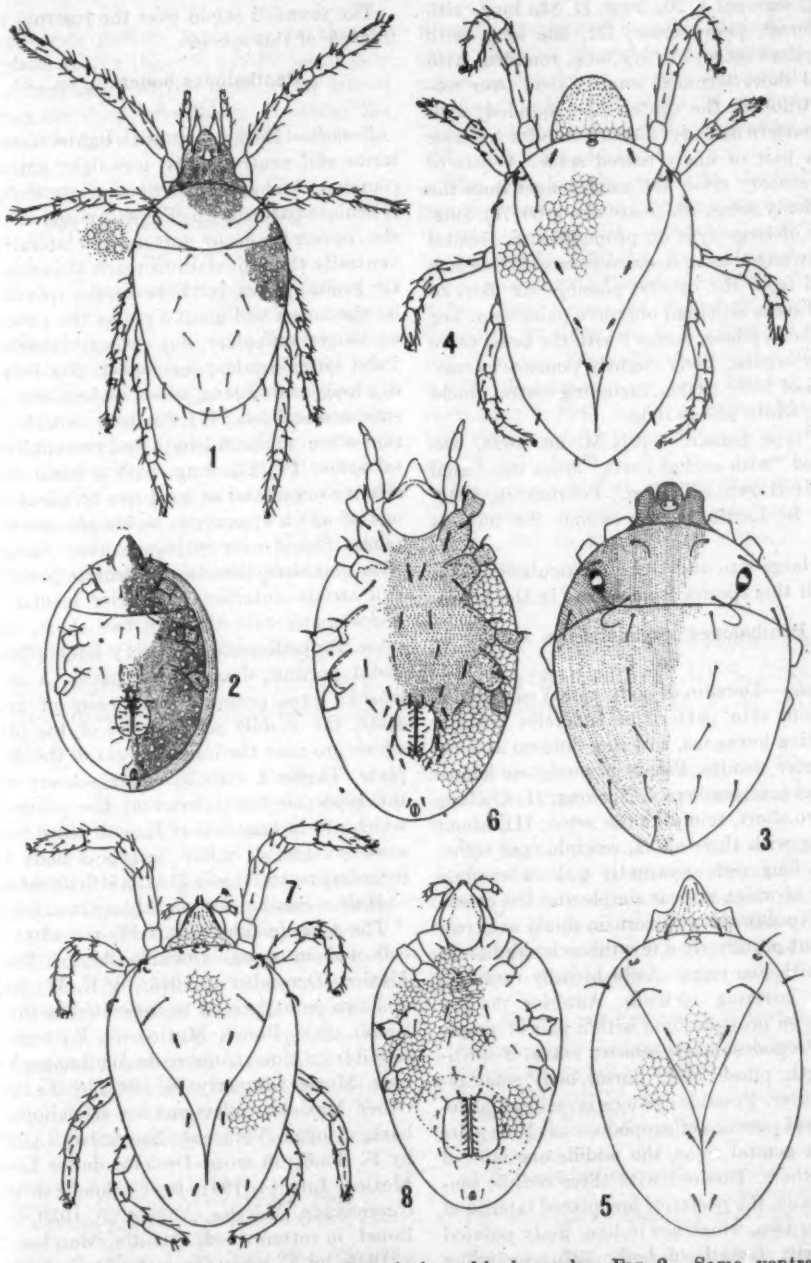


FIG. 1.—*Stereotydeus mexicanus*, n. sp. Dorsal view of body, male. FIG. 2.—Same, ventral view, male. FIG. 3.—*Stereotydeus lattimorei*, n. sp. Dorsal view of body, female. FIG. 4.—*Penthalodes oregonensis*, n. sp. Dorsal view of body, female. FIG. 5.—*Penthalodes boneti*, n. sp. Dorsal view of body, female. FIG. 6.—Same, ventral view, male. FIG. 7.—*Penthalodes turneri*, n. sp. Dorsal view of body, female. FIG. 8.—Same, ventral view, female.

strong; segment I, 20μ long; II, 83μ long, with two dorsal, pilose setae; III, 33μ long, with three pilose setae; IV, 27μ long, rounded, with several short terminal setae. Shield over rostrum trilobed, the center lobe rounded, with same pattern as body; median anterior tubercle with a pair of finely haired setae. A pair of pilose sensory setae not much longer than the pilose body setae, which are about 60–70μ long. A pair of large eyes on propodosoma. Genital setae arranged as in *S. mexicanus* with one pair laterad from the others; possibly six pairs of genital setae although only five pairs seen. Leg setae short, pilose; tarsus I with the usual three sensory organs. Body slightly pointed to rear. Length of body 1,000μ, including rostral shield 1,142μ; width about 700μ.

The type female, U.S.N.M. no. 1698, was collected "with orchid roots," from the Canal Zone, at Brownsville, Tex., February 8, 1946, by R. B. Lattimore, for whom the mite is named.

The large size and lack of reticulations distinguish this species from others in the genus.

Penthalodes oregonensis, n. sp.

FIG. 4

Female.—Dorsum of body with V-shaped indentation, skin pattern of tubercles forming connecting hexagons, covering dorsum and entire venter of mite. Palpus of moderate length and thickness; segment I, 20μ long; II, 40μ long with two short, semiplumose setae; III, about 23μ long with three short, semiplumose setae; IV, 10μ long with apparently 6 short terminal setae, 2 of which appear simple and the others pilose. No reticulate pattern on shield over rostrum, but posteriorly a few tubercles and anteriorly with fine hairs; shield broadly rounded, entirely covering rostrum. Anterior median tubercle on propodosoma with a pair of simple setae. Propodosomatic sensory setae of medium length, pilose; other dorsal body setae pilose, shorter. Possible eye lens present on anterior lateral portions of propodosoma. Nine pairs of pilose genital setae, the middle one laterad of the others. Tarsus I with three rodlike sensory organs, the posterior one placed laterad of the other two, which are in line. Body pointed posteriorly. Length of body 327μ; including rostrum 380μ; width 200μ.

The type, U.S.N.M. no. 1699, and a single paratype were taken from fir duff, Corvallis, Oreg., October 28, 1939, collector unknown.

The rounded shield over the rostrum is distinctive of this species.

Penthalodes boneti, n. sp.

FIGS. 5, 6

Female.—Dark brown with lighter dorsoposterior and ventral spots; legs light red. Body rounded, V-shaped indentation present; the reticulate pattern, which is composed of tubercles, covers the entire dorsum, and laterally and ventrally the reticulations reach the coxae and the genital plates, but between the area formed by the coxae and genital plates the pattern is no longer reticulate, but entirely tuberculate. Palpi long, slender; segment I, 20μ long; II, 67μ long, with a long pilose median seta and a similar distal seta; III, 63μ long, with a posterior seta of medium length and two similar distal setae; IV, 27μ long, with a basal rodlike sensory organ and at least five terminal setae, one of which appears to be simple, the others pilose. Shield over rostrum small, triangular, with shoulders, the shield reticulate posteriorly and striate anteriorly. Anterior median propodosomatic tubercle with two short, simple setae. Propodosomatic sensory setae pilose on distal portion; dorsal setae pilose. A pair of lenslike eyes present. Nine pairs of genital setae, the middle seta laterad of the others, which are near the inner margin of the genital plate. Tarsus I with 3 rodlike sensory setae, the posterior one laterad of the other two, which are in line; tarsus II with three rodlike sensory setae, all in line. Length of body 433μ; including rostral shield 513μ; width about 333μ.

Male.—Similar but slightly more elongated.

The type female, U.S.N.M. no. 1700, was collected in moss, Desierto de los Leones, Mexico, December 5, 1943, by E. W. Baker, and two paratypes, to be deposited in the collection of F. Bonet, Mexico, D. F., were collected from moss, Cumbre de Acultzingo, Veracruz, Mexico, January 16, 1942, by F. Bonet. Other Mexican collections are as follows: In bark, Atoyac, Veracruz, November 13, 1941, by F. Bonet; in moss, Desierto de los Leones, Mexico, July 14, 1941, by F. Bonet; in moss, Cuernavaca, Morelos, August 26, 1939, by F. Bonet; in rotten wood, Cuautla, Morelos, July 8, 1941, by F. Bonet; in moss, Desierto de los Leones, Mexico, February 7, 1943, by E. W. Baker.

The lack of ventral reticulation and the type of dorsal setae are distinctive of this species.

The reticulate pattern is similar to that of *Penthalodes ovatus* (Koch), but *P. boneti* possesses dorsal and posterior setae whose lateral branches are short, whereas in *P. ovatus* the branches are fewer and may be as long as the main stem.

Penthalodes turneri, n. sp.

FIGS. 7, 8

Female.—Dorsum of body with V-shaped indentation; skin pattern of connecting hexagons over entire dorsum and entire venter. Palpi long, slender; segment I, 20μ long; II, 40μ long, with a median and a distal nearly semiplumose setae; III, 40μ long, with a basal and two distal semiplumose setae; IV, 20μ long, with apparently six short pilose setae. Shield over rostrum small, triangular, reticulate posteriorly and striate anteriorly. Anterior median tubercle of propodosoma with two short simple setae. Dorsal body setae almost semiplumose, with three to five lateral branches; anterior dorsal setae 6-rayed; propodosomatic sensory setae pilose on distal half. Genital setae as in other species. Tarsi I and II as in other species. Length of body 286μ; including rostral shield 333μ; width about 214μ.

The type female, U.S.N.M. no. 1701, a paratype and 4 other specimens were collected in peach-orchard soil, Stoddard County, Mo., September 25, 1936, by W. F. Turner. Other specimens were collected as follows: In soil, Tyler, Tex., November 23 and 24, 1939, and February 23, 1938 by L. D. Christenson; in soil, Denison, Tex., February 19, 1938, by L. D. Christenson; in soil, Menard, Tex., November 4, 1943, by O. A. Babcock; in rubbish in cottonfields, Batesburg, S. C., February 19, 1910, by H. F. Wilson.

This species is distinctive in that the reticulate pattern covers the dorsum and entire venter, and in the different type of dorsal body setae.

ENTOMOLOGY.—*Synopsis of the genus* Nealyda *Dietz, with descriptions of new species (Gelechiidae: Lepidoptera).*[1]

J. F. GATES CLARKE, U. S. Bureau of Entomology and Plant Quarantine. (Communicated by C. F. W. MUESEBECK.)

The monobasic genus *Nealyda* was erected by Dietz[2] for *Nealyda bifidella* Dietz. Under the genus *Didactylota* Walsingham[3] described the West Indian *bicolor*. Busck[4] stated that this species was certainly referable to *Nealyda*, but the generic transfer was not made until 1925 by Meyrick.[5] In 1900 Busck[6] added two more species, *N. pisoniae* and *N. kinzelella*. Later Meyrick[7] described *N. accincta* and *N. leucozostra* and in this paper two new species, *neopisoniae* and *phytolaccae*, are added, bringing to a total of eight the number of described species in the genus.

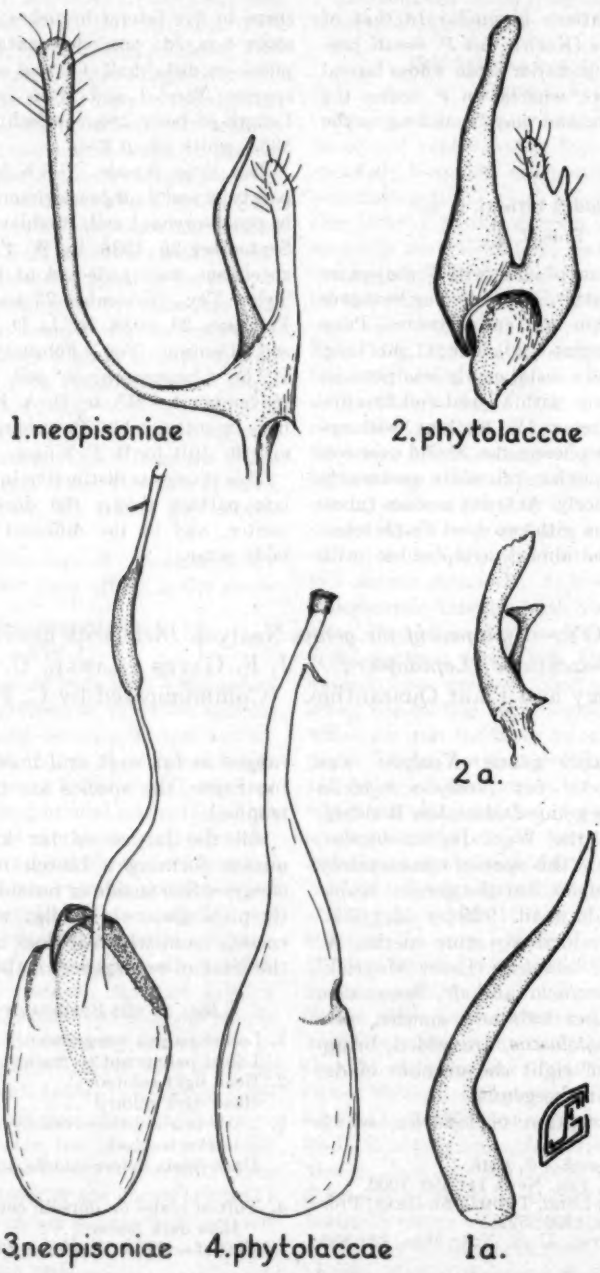
With the exception of *bifidella*, which ranges as far west and north as Washington State, the species are tropical or subtropical.

All the larvae so far known are leaf miners forming a blotch mine. Pupation occurs either inside or outside the mine, but the pupa always is in a flat, whitish or tinted cocoon from which it does not protrude at the time of emergence of the adult.

KEY TO THE SPECIES OF NEALYDA

1. Labial palpus conspicuously annulated.....2
   Labial palpus not so marked.....6
2. Head light colored.....3
   Head dark colored.....5
3. Dark fascia before middle of forewing dark brown to black.....4
   Dark fascia before middle deep velvety brown .....*kinzelella* Busck
4. Tuft of scales on dorsum contrastingly darker than dark fascia.....*pisoniae* Busck
   Tuft of scales on dorsum not darker than fascia .....*phytolaccae*, n. sp.
5. Median light fascia of forewing with blotch of dark color in center.....
   .....*neopisoniae*, n. sp.
   Median light fascia without such blotch of dark color.....*bifidella* Dietz

[1] Received November 7, 1946.
[2] DIETZ, W. G., Ent. News 11: 350. 1900.
[3] WALSINGHAM, LORD, THOMAS DE GRAY, Proc. Zool. Soc. London, 1891: 522.
[4] BUSCK, A., Proc. U. S. Nat. Mus. 25: 835. 1903.
[5] MEYRICK, E., *in* Wytsman, *Genera insectorum*, fasc. 184: 24. 1925.
[6] BUSCK, A., Proc. U. S. Nat. Mus. 23: 229, 230. 1900.
[7] MEYRICK, E., *Exotic Microlepidoptera* 3: 5. 1923.



FIGS. 1–4.—1–1a, *Nealyda neopisoniae*, n. sp.: 1, Inner surface of right harpe; 1a, aedeagus, lateral view. 2–2a, *Nealyda phytolaccae*, n. sp.: 2, Inner surface of right harpe; 2a, aedeagus, lateral view. 3, *Nealyda neopisoniae*, n. sp.: Ventral view of bursa copulatrix and ductus bursae. 4, *Nealyda phytolaccae*, n. sp.: Ventral view of bursa copulatrix and ductus bursae.

6. Fine, leaden, metallic lines before and beyond tornus.....*accincta* Meyrick
No such metallic lines.....7
7. Basal half of forewing gray.*leucozostra* Meyrick
Basal half of forewing fawn color.....
.....*bicolor* (Walsingham)

Nealyda phytolaccae, n. sp.

Labial palpus black and white annulated. Antenna annulated black and white. Head pale luteous overlaid with fuscous. Thorax and tegula blackish fuscous to black basally shading to pale luteous. Forewing light yellowish brown basally shading to blackish fuscous or black slightly before middle where there is a sharp line of demarcation, with the lighter basal shade repeated followed by a gradual shading to blackish fuscous or black at apex; at apical fourth, on costa, a few whitish scales continue across wing as an ill-defined transverse line; cilia fuscous strongly overlaid with blackish fuscous and black. Hind wing and cilia fuscous; from costa, on underside of male, a yellowish hair pencil. Legs sordid white overlaid and annulated with blackish fuscous. Abdomen blackish fuscous above, paler beneath.

Male genitalia.—Dorsal lobe of harpe slender, slightly constricted before apex, extending beyond uncus; ventral lobe broad, about two-thirds the length of dorsal lobe, with divided distal end. Aedeagus slender, curved, simple. Vinculum with long, pointed, lateral processes.

Female genitalia.—Ductus bursae with a narrow sclerotized ring before ostium; inception of ductus seminalis well before ostium; signum a small, weakly sclerotized hook.

Alar expanse, 6–8 mm.

Type.—U.S.N.M. no. 58211.

Type locality.—Stock Island, Fla.

Food plant.—*Phytolacca decandra* L.

Described from the male type (21-III-1945) and eight male and eight female paratypes from the type locality and Bonefish Key, Fla., all showing March 1945 dates and reared from larvae collected by C. L. Griswold.

Paratypes in the United States National and British Museums.

This species is nearest to *N. pisoniae* Busck in genitalia but differs from it by the narrow dorsal lobe and the divided ventral lobe of the harpe.

Nealyda neopisoniae, n. sp.

Labial palpus black and white annulated. Antenna black with white annulations. Head, base of thorax and tegula and extreme base of forewing blackish fuscous with minute white irrorations; remainder of thorax and tegula, and forewing to one-third, pale fawn; from basal third to middle and again at apical third are bands of dark golden brown separated by a fascia of pale fawn; in the center of this fascia is a blackish fuscous blotch with minute white irrorations; a dorsal tuft at center and the apical fourth of wing, including the cilia, also blackish fuscous. Hind wing and cilia very dark fuscous; from costa, on underside, in male, a white hair pencil. Legs blackish fuscous irrorated and annulated with white. Abdomen fuscous.

Male genitalia.—Harpe with dorsal arm divided, U-shaped; one element extending beyond uncus, dilated distally, the other element shorter, sharply pointed; ventral lobe fleshy, weak, about one-half the length of the long dorsal element. Aedeagus long, curved, simple, pointed. Vinculum divided into two broad posterolateral processes.

Female genitalia.—Ductus bursae with a sclerotized area from middle to posterior fourth; inception of ductus seminalis well before ostium. Signa a large three-pointed curved plate and a short narrow sclerotized lateral plate.

Alar expanse, 6–7 mm.

Type.—U.S.N.M. no. 58212.

Type locality.—Jaimanitas, Habana Province, Cuba.

Food plant.—*Pisonia aculeata* L.

Described from the male type, one male and two female paratypes as follows: Jaimanitas, Habana Province, two males (22-25-IV-1934, A. R. Otero); Central Jaronú, two females (25-XI-30, L. C. Scaramuzza).

This species can be distinguished from all other members of the genus by the divided dorsal element of the harpe and the large signum.

ORNITHOLOGY.—*New subspecies of birds from peninsular Siam.*[1] H. G. DEIGNAN, U. S. National Museum. (Communicated by HERBERT FRIEDMANN.)

I

Study of the birds of southern Siam has disclosed that two more peninsular forms, a kingfisher and a shrike babbler, may be awarded subspecific recognition. For the former, I propose the name—

Halcyon concreta peristephes,
n. subsp.

Type.—Adult male, U.S.N.M. no. 330226, collected at Khao Luang (lat. 11° 40′ N., long. 99° 35′ E.), a mountain southwest of Prachuap Khirikhan (Ko Lak), southwestern Siam, on October 6, 1930, by Hugh McCormick Smith (original number 4235).

Diagnosis.—From *concreta* of Sumatra and the M lay States, distinguished in either sex by greater measurements (wing: 111–115 mm, against 102–110 mm; tail: 58.4–63.6 mm, against 49.6–56.7 mm); by having the rufous of the collar and underparts slightly paler, and the center of the abdomen much more decidedly and extensively albescent; and, in the female, by having the buffy-white terminal spots on the scapulars and upper wing coverts somewhat larger in size.

Range.—Peninsular Siam from Trang Province at lat. 11° 40′ N.; southernmost Tenasserim.

Remarks.—*H. c. borneana* of Borneo agrees with *peristephes* in measurements but matches *concreta* in color characters.

II

The white-browed shrike babbler of the mountains of Peninsular Siam has always been treated as inseparable from *aeralatus* of northernmost Tenasserim and northwestern Siam, with which it agrees well enough in color; it proves to be a considerably smaller race, which I intend to call—

Pteruthius erythropterus schauenseei,
n. subsp.

Type.—Adult male, U.S.N.M. no. 311095, collected at 4,000 feet on Khao Luang (lat. 8° 30′ N., long. 99° 45′ E.), a mountain west of Nakhon Si Thammarat, peninsular Siam, on July 20, 1928, by Hugh McCormick Smith (original number 2260).

Diagnosis.—From *aeralatus*, separable only by its shorter wing. Six males of *schauenseei* have this measurement 69–77 mm (average: 73.5 mm), while 22 males of *aeralatus* have it 78–82 mm (average: 79.8 mm); three females of *schauenseei* have it 72.75 mm (average: 73.3 mm), while 24 females of *aeralatus* have it 76–83 mm (average: 79.3 mm).

Range.—Isolated mountains of peninsular Siam. The populations of the mountains of the Malay States are variably intermediate between *schauenseei* and *cameranoi* (Sumatra).

Remarks.—*P. e. robinsoni* of Borneo agrees with *schauenseei* in measurements but differs from both *schauenseei* and *aeralatus* in the deeper gray of the upperparts and the stronger pinkish wash on the flanks.

[1] Published with permission of the Secretary of the Smithsonian Institution. Received September 30, 1946.

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